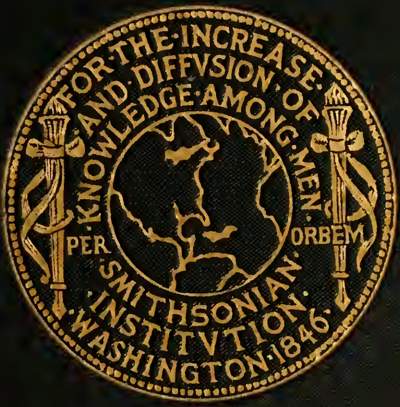
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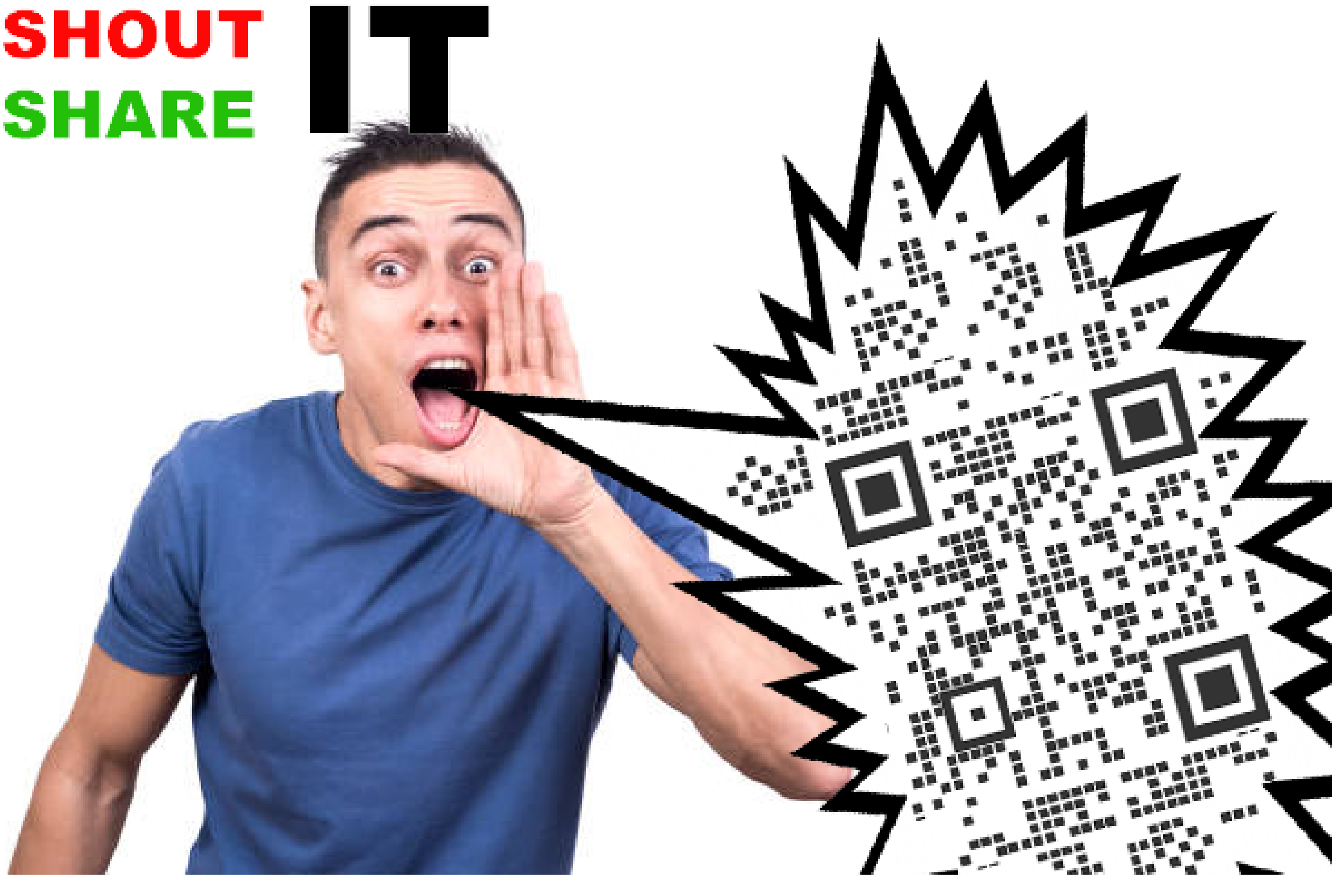
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SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
Bulletin 145

A REVISION OF THE NORTH AMERICAN SPECIES OF BUPRESTID BEETLES BELONGING TO THE GENUS AGRILUS

BY

W. S. FISHER
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United States Department of Agriculture

SMITHSONIAN INSTITUTION
279776
U. S. NATIONAL MUSEUM

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1928

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The scientific publications of the National Museum include two series, known, respectively, as *Proceedings* and *Bulletin.*

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The *Bulletin*, the first of which was issued in 1875, consists of a series of separate publications comprising monographs of large zoological groups and other general systematic treatises (occasionally in several volumes), faunal works, reports of expeditions, catalogues of type-specimens, special collections, and other material of similar nature. The majority of the volumes are octavo in size, but a quarto size has been adopted in a few instances in which large plates were regarded as indispensable. In the *Bulletin* series appear volumes under the heading *Contributions from the United States National Herbarium*, in octavo form, published by the National Museum since 1902, which contain papers relating to the botanical collections of the Museum.

The present work forms No. 145 of the *Bulletin* series.

Alexander Wetmore,
Assistant Secretary, Smithsonian Institution.

Washington, D. C., *November 14, 1928.*

CONTENTS

Page

Introduction ---- 1
Acknowledgments ---- 1
Classification ---- 2
Description of the genus ---- 3
Discussion of parts ---- 4
Description of species ---- 18
  Agrilus ferrisi ---- 18
    nevadensis ---- 20
    subtropicus ---- 22
    lucanus ---- 25
    champlaini ---- 27
    ruficollis ---- 29
    lateralis ---- 34
    obtusus ---- 37
    difficilis ---- 39
    cupricollis ---- 42
    cupreomaculatus ---- 44
    fuscipennis ---- 46
    townsendi ---- 48
    arbuti ---- 50
    angelicus ---- 53
    masculinus ---- 56
    albocomus ---- 59
    paramasculinus ---- 61
    arcuatus ---- 63
    arcuatus subspecies fulgens ---- 68
    arcuatus subspecies torquatus ---- 69
    arcuatus subspecies coryli ---- 71
    crinicornis ---- 72
    defectus ---- 75
    geminatus ---- 78
    otiosus ---- 81
    atricornis ---- 86
    transimpressus ---- 88
    frosti ---- 90
    juglandis ---- 93
    puncticeps ---- 96
    macer ---- 98
    pulchellus ---- 101
    vittaticollis ---- 104
    benjamini ---- 107
    audax ---- 109
    pilosicollis ---- 111
    bilineatus ---- 113

Description of species—Continued.

	Page
Agrilus bilineatus subspecies carpini	119
quercicola	120
criddlei	122
olivaceoniger	124
acutipennis	127
auricomus	130
quadriimpressus	133
auroguttatus	135
granulatus	138
quadriguttatus	141
niveiventris	145
fulminans	148
populi	150
betulae	153
pensus	155
horni	158
anxius	160
cavatus	166
aureus	168
concinnus	171
restrictus	173
walsinghami	176
inhabilis	178
snowi	180
costipennis	182
baboquivariae	184
huachucae	186
ventralis	188
obolinus	190
fallax	193
scitulus	196
obsoletoguttatus	199
lautuellus	202
ornatulus	205
dozieri	207
viridis var. fagi	209
politus	213
politus pseudocoryli	218
politus subspecies burkei	219
sinuatus	220
coeruleus	224
crataegi	226
cephalicus	229
strigicollis	232
gibbicollis	234
pubifrons	237
olentangyi	239
mimosae	241
chiricahuae	243
aeneocephalus	245
malvastri	247
falli	249

Page
Description of species—Continued.
Agrilus illectus 251
sierrae 253
felix 255
jacobinus 258
floridanus 260
impexus 262
cupreonitens 265
addendus 267
quercus 270
palmacollis 272
prosopidis 275
exiguellus 277
acaciae 279
abductus 281
pseudofallax 284
egeniformis 286
dolli 289
lecontei 291
lecontei celticola 294
abjectus 295
blandus 297
subcinctus 299
muticus 302
lacustris 305
imbellis 308
barberi 311
abditus 313
pubescens 315
pusillus 317
eleanorae 320
celti 322
egenus 325
abstersus 329
putillus 331
oblongus 333
praepolitus 335
viridifrons 335
fulgidicollis 335
umbratus 336
subalteata 336
14-spilota 336
Explanation of plates 336
Index 341

A REVISION OF THE NORTH AMERICAN SPECIES OF BUPRESTID BEETLES BELONGING TO THE GENUS AGRILUS

By W. S. Fisher

Of the Bureau of Entomology, United States Department of Agriculture

INTRODUCTION

The present paper is the result of several years' study of the genus *Agrilus*, and comprises all of the species found in the mainland of America north of Mexico. The task of revising the genus was undertaken because the group is an important one economically, and at the same time has been badly confused. Owing to the extreme variability of the species, erroneous identifications have been many, and the published distribution and host records are in a considerable part incorrect. Fortunately, the collection of the United States National Museum, upon which this work is largely based, is rich in reared series of many of the species. This has helped immeasurably in the selection of characters which will be useful for the separation of the species. The types have been examined of all the described species except those which have been lost or are deposited in European collections.

One hundred and seventeen species and 8 subspecies or varieties are treated in this paper, of which 27 species and 2 subspecies are described as new. One fossil species and 5 other species which are either unknown or belong to other genera are omitted from the key, but these species are briefly treated at the end of the paper.

ACKNOWLEDGMENTS

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All of the drawings were made by Miss Eleanor T. Armstrong, of the Bureau of Entomology, and it is my desire to here express my appreciation of Miss Armstrong's conscientious and careful work.

CLASSIFICATION

Family BUPRESTIDAE

Tribe AGRILINI

Genus AGRILUS Curtis

Agrilus Curtis, British Entomology, vol. 2, 1825, No. 67 (Genotype *Buprestis viridis* Linnaeus, designated by Curtis).—Eschscholtz, Zool. Atlas, vol. 1, 1829, p. 9 (reprint p. 8).—Stephens, Illustr. British Ent., vol. 3, 1830, pp. 239–241, pl. 19, fig. 2.—Solier, Ann. Ent. Soc. France, ser. 1, vol. 2, 1833, pp. 300–303, pl. 2, fig. 25.—Castelnau and Gory, Mon. Bupr., vol. 2, 1837, *Agrilus*, pp. 1–70, pls. 1–15.—Gory, Mon. Bupr. Suppl., vol. 4, 1841, pp. 207–269, pls. 34–45.—Melsheimer, Cat. Desc. Coleopt. United States, 1853, p. 65.—Lacordaire, Gen. Col., vol. 4, 1857, pp. 83–85.—LeConte, Trans. Amer. Philos. Soc., new ser., vol. 11, 1859, pp. 242–250; Smiths. Misc. Coll., No. 140 (List Coleopt. North America), 1863, p. 43.—Gemminger and Harold, Cat. Coleoptera, vol. 5, 1869, pp. 1435–1447.—Saunders, Cat. Buprestidarum, 1871, pp. 112–126.—Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, pp. 90–96; Check List Col. Amer. North of Mexico, 1873, pp. 65–66.—Austin, Suppl. to Check List Col. Amer. North of Mexico, 1880, p. 27.—Henshaw, List Col. Amer. North of Mexico, 1885, p. 75.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 277–336, pl. 8.—Kerremans, Mem. Soc. Ent. Belg., No. 1, 1892, pp. 243–278.—Henshaw, List Col. Amer. North of Mexico, Suppl. 3, 1895, p. 20.—Kerremans, Wytsman's Gen. Insectorum, fasc. 12, pt. 4, 1903, pp. 266–292.—Leng, Cat. Coleopt., 1920, pp. 183–184.—Chamberlin, Cat. Buprestidae, 1926, pp. 46–86.—Leng and Mutchler, Cat. Coleopt. Suppl., 1927, p. 30.

Teres HARRIS, New England Farmer, vol. 8, ser. 1, 1829, No. 1, pp. 2–3.

Engyaulus WATERHOUSE, Biol. Centr.-Amer., Coleopt., vol. 3, pt. 1, 1889, pp. 50–51, pl. 4, fig. 9 (includes—1. *Agrilus pulchellus* Bland: 2. *Engyaulus rubrovittatus* Waterhouse).—LENG, Cat. Coleopt., 1920, p. 183.—CHAMBERLIN, Cat. Buprestidae, 1926, pp. 200–201 (designates *Agrilus pulchellus* Bland as the genotype).

The biliography given above is not complete for the genus, as only the more important articles are cited, and especially those that refer to the American species. The name *Agrilus* was first established by Megerle and has been credited to him by many of the early entomologists, including Dejean, but he is not recognized by the later writers. Megerle published three papers between the years 1801 and 1812, and it is just possible that he used *Agrilus* in one of these publications in such a manner as to validate the name, but since none of these publications are available to the writer this reference could not be verified. *Teres* was erected as a subgenus of Buprestis by Harris (1829), and included (1) *Buprestis granulata* Say; (2) *B. ruficollis* Fabricius; (3) *B. innuba* Fabricius, etc., but *Agrilus* Curtis (1825) has priority by a few years.

In the above papers by Melsheimer (1853), Lacordaire (1857), LeConte (1863), Gemminger and Harold (1869), Saunders (1871), Crotch (1873), Austin (1880), Henshaw (1885, 1895), Kerremans (1892, 1903), Leng (1920), and Leng and Mutchler (1927), many American species of *Agrilus* are listed, but since these publications are only catalogues the citations are omitted from the bibliography under the species.

DESCRIPTION OF THE GENUS

Head vertical and grooved, flat, tuberculate, or simply convex in front; epistoma emarginate in front and narrowed by the antennal cavities; cheeks unarmed or with an obtuse tooth on each side; antennal cavities rather large, oblique, prolonged into a groove in front, and situated at some distance from the eyes. Antennae variable in length, serrate from the fourth or fifth joints, and not inserted in a groove in the prosternum while in repose; first joint elongate and robust; second, third, and sometimes the fourth, short and feebly clavate, and the following joints more or less triangular, serrate on the inner side, and with a terminal poriferous fovea. Eyes large and oblong. Pronotum usually wider than long, rather convex, and broadly sinuate in front; sides more or less arcuately rounded, and with two distinct margins; base sinuate, with a broad, median lobe, which is truncate, rounded, or emarginate in front of scutellum; surface with or without depressions, and usually with a distinct carina near posterior angles. Scutellum broad, acute posteriorly, and sometimes transversely carinate. Elytra elongate, sinuate at base, with or without longitudinal costae, and the apex variable, sometimes expanded, broadly rounded, acute, or strongly dentate. Sternal cavity formed almost entirely by the metasternum. Mesosternum divided, the lateral branches very short. Prosternum broad, and more or less lobed in front. Middle coxae not more widely separated than the anterior ones; posterior coxae short, slightly dilated internally, narrowest at middle, and strongly dilated anteriorly at the lateral margin. Legs slender; femora fusiform, not dentate on inner margin, and frequently more strongly swollen in the males; tibiae slender and subcylindrical, the anterior ones sometimes ciliate; tarsi long and slender, and the joints armed with distinct lamellae, the first joint of posterior pair as long or longer than the following two joints unites; tarsal claws cleft or dentate. Body elongate, feebly convex, broadly rounded in front, and attenuate posteriorly.

DISCUSSION OF PARTS

Head.—The front may be flat, moderately convex, or very convex. In the latter case the mouth seems more retracted and inferior. In nearly all of the species the head has a median depressed line beginning at the occiput, but the line varies both in length and depth, forming in some species a deep frontal depression, and in other species the front is broadly concave. The epistoma is variable in form, sometimes being very narrow between the antennal cavities, and at other times distinctly transverse. Sexually the head varies in color, sculpture, and in the density of the pubescence. The form of the lateral margins of the front or of the eyes is of taxonomic importance; some species have the front with the sides parallel to each other, whereas in other species these margins are sinuate. It is, however, difficult to make use of this character in the key for separating species, because the front of the head is sexually variable in some of the species, the males having the front rather narrow, with the sides sinuate, whereas in the females the front is distinctly wider, with the sides nearly parallel to each other.

Antennae.—In some species the antennae are long and slender, with the joints longer than wide; in others they are short and comparatively stout, with the joints as wide, or even wider than long. The most important character is in the form of their serration, and the species can be separated into two series, one in which the serration begins at the fourth joint, and the other with the serration beginning at the fifth joint. There may be at times individual specimens which might be difficult to determine to which series it should be referred, but when the fourth joint resembles the fifth joint more nearly than it does the third, the specimen should be referred to the first series, but when the third and fourth joints are similarly cylindrical, then it belongs to the second series.

Pronotum.—The sides of the pronotum when seen from above are quite variable in shape, and in many of the species can not be used in separating allied species. The lateral margin is acute and forms the marginal carina, which, when viewed from the side, is straight or sinuate. Under this carina there is another more or less arcuate one, called the submarginal carina, which joins the marginal carina at or in front of the posterior angles, but rarely the two carinae are separated for their entire length. On each side near the posterior angle is a prehumeral carina (called the lateral carina by some writers) and this carina is more or less strongly developed, arcuate or straight, sometimes long and approaching the marginal carina near the middle; frequently the carina is replaced by an obtuse swelling, and in a number of species it is entirely absent. The disk is convex, or more or less uneven, and sometimes very deeply depressed.

Scutellum.—In many of our species the scutellum is distinctly transversely carinate, the carina entirely absent in others, and in a few cases it is strongly interrupted at the middle.

Elytra.—In the greater number of our species the sides of the elytra are slightly sinuate behind the humeri, and then more or less expanded behind the middle, but in a few species they are narrowed from the humeri to apex, without scarcely any sinuations. In most cases the sides of the abdomen are more or less visible from above, especially in the females. The surface is usually more or less flattened above, sometimes with the sutural margins elevated posteriorly, and the space along the suture depressed. In a number of the species each elytron has a vague longitudinal costa, which is very distinct in a few of the species of the tropical type found in the southwestern part of the country. The surface sculpture is nearly the same in all our species, only varying in coarseness, and is described as imbricate-punctate (resembling the scales on a fish or shingles on a roof). The surface is usually more or less pubescent, when seemingly glabrous, it is in reality covered with a very fine, nearly invisible blackish pilosity, and in many of the species the elytra are ornamented with pubescent spots, longitudinal vittae, or irregular designs, but frequently some of these markings are more or less denuded, and care must be exercised in making use of them. The apices of the elytra are usually rounded in our species, but in a few species they are acuminate, prolonged, or bidentate.

Prosternum.—The prosternum is anteriorly margined by a more or less developed prosternal lobe, which is rounded, or more or less deeply emarginate in front, and sometimes almost concealing the mouth. In many of the species this emargination is quite variable in depth, and care must be taken in making use of this character. The prosternal process has the sides parallel, or expanded behind the coxal cavities, and the apex is subject to great modifications. In many of the species the tip enters the metasternum by a triangular notch, while in others the tip is abruptly bent upward and is concealed in the metasternum. When the tip is closely applied to the metasternum, the part of the tip not concealed is triangular, rounded, truncate or dilated. For convenience the visible free portion has been assumed to be the tip, and is so spoken of in the descriptions. Sexual dimorphism is here also well marked; in some species the prosternal process in the male is covered with fine, long, erect pubescence, whereas in the female the surface is nearly glabrous.

Abdomen.—The abdomen is more or less convex, and along the sides is a distinct ridge, which is sometimes interrupted on the first and second segments. Although this ridge is variable within certain limits, it is not sufficiently so to use in the grouping of species. This ridge divides the ventral segments from the vertical portions of the segments which are sometimes more densely clothed with pubescence than the ventral parts, and are frequently more or less depressed and ornamented with pubescent spots. The suture between the first and second segments is usually entirely obliterated, but rarely it is more or less indicated at the sides. The last segment is either usually rounded or rarely truncate at the apex in our species. The males of some species have a longitudinal vitta of long, white hairs on the first and second segments, and the surface is longitudinally depressed.

Pygidium.—In nearly all of the species the surface is provided with a median smooth or elevated line, in many species forming a distinct ridge, and in some of the species the ridge projecting posteriorly, and forming a spine which is truncate or emarginate at the apex. The absence or presence of this projecting carina is one of the most constant characters, and only varying in length. In *pulchellus* the pygidium is acutely produced at the apex, with the carina strongly elevated but not projecting beyond the apex.

Legs.—The length of the posterior tarsi in comparison with the tibiae is somewhat variable, but it is usually longer in the males than in the females. In a large number of the species sexual differences have been observed in the tibiae, consisting of a short tooth or mucro on the inner margin at the apical angle of the anterior and middle tibiae, sometimes on all of the tibiae of the males of some species, but the tibiae of the females are usually not armed with a distinct tooth at apex. A useful character is found in the form of the tarsal claws; these are either simply cleft, or cleft in such a manner that the inner portions are turned inward, and the apices nearly touching each other. Some of the species have the inner portions of the claws only feebly turned inward, and these are placed in the key with those species having the claws simply cleft. In making use of this character in the key, the claws on the anterior feet should be used, as the claws sometimes not only differ in the two sexes, but also in the three pairs of feet, especially in the males.

Genitalia.—The male genitalia are strongly chitinous, and consist of the lateral and median lobes. They differ from the genitalia in the family Elateridae by having the basal piece and lateral lobes consolidated, and by the coadaptation between the lateral and median lobes to allow the median lobe to be extended beyond the tips of the lateral lobes. The genitalia show considerable differences in shape and sculpture, sometimes in the most closely allied species, but show scarcely any variation in the species. It it a very useful character for separating the species, and especially in checking up individual specimens that are more or less abnormal.

The genus *Agrilus* as a whole, is a newer, more plastic group of the Buprestidae, with structural characters unsettled, and many species in a process of evolution. The species of this genus have probably developed at a more recent date, for so far as known, none of them live in conifers, which are of earlier origin than the deciduous trees. Biologically our species can be placed into three groups as follows.

First.—Many of our species are well established and scarcely any variations can be found in their structural characters. These species can be easily distinguished, the genitalia of the male are quite different, therefore, not permitting their interbreeding, the species as a rule confine their habits to a single genus or closely allied genera of host plants, and scarcely any intermediate forms are found.

Second.—In some species such as *egenus*, *otiosus*, etc., the females are not distinguishable on structural characters, although the males as a rule are easily separated on secondary, external sexual characters, the male genitalia show considerable differences similar to those in the first group, and the species usually confine their habits to a single host plant.

Third.—This group is composed of species such as *politus*, *arcuatus*, etc., which are at present in a high state of evolution, and must be considered as composed of a number of phytophagic species. These phytophagic species can not be separated on any structural characters, and the genitalia of the males are almost identical, which will permit interbreeding between the different forms, but the species have become capable of living only in one genus or species of plants, which consequently they select. In this group a number of intermediate forms can be expected, as some adults may accidentally select a new host plant and continue to breed in that plant.

The names used for the trees in the present work are according to Sudworth.[1]

KEY TO THE SPECIES OF AGRILUS

1. Tips of the elytra prolonged ---- 2.
   Tips of the elytra not prolonged ---- 5.
2. Elytra with pubescent markings ---- 3.
   Elytra without pubescent markings ---- (1) **ferrisi** Dury.
3. Scutellum transversely carinate; pubescence on elytra forming designs; elytral tips arcuately emarginate on inside and forming an acute tooth near outer margin ---- 4.
   Scutellum not carinate; pubescence on elytra not forming designs; elytral tips produced into an acute tooth at middle ---- (2) **nevadensis** Horn.
4. Posterior and anterior median depressions on pronotum equal in width; pubescence on elytra yellowish white ---- (3) **subtropicus** Schaeffer.
   Posterior median depression on pronotum distinctly wider than anterior depression; pubescence on elytra brownish yellow ---- (4) **lucanus** Fall.
5. Antennae serrate, beginning at fourth joint ---- 6.
   Antennae serrate, beginning at fifth joint ---- 84.
6. Tarsal claws cleft in such a manner that the inner portion is turned inward, nearly or quite touching that of the opposite side ---- 7.
   Tarsal claws simply cleft, the inner portion not, or only feebly turned inward, and the tips distant ---- 30.
7. Pygidium with a projecting carina ---- 8.
   Pygidium without a projecting carina ---- 10.
8. Body above uniformly black ---- (5) **champlaini** Frost.
   Body above bicolored; head and pronotum aeneous or cupreous; elytra black or piceous ---- 9.
9. Front of head deeply depressed; elytra black, and without distinct pubescence; body beneath black ---- (6) **ruficollis** (Fabricius).
   Front of head feebly depressed; elytra piceous, and uniformly clothed with very short hairs; body beneath aeneous or cupreous ---- (7) **lateralis** (Say).
10. Lateral margins of first two abdominal segments nearly or entirely obliterated ---- 11.
    Lateral margins of first two abdominal segments distinct ---- 12.
11. Pronotum deeply depressed on disk and along lateral margins; scutellum not transversely carinate ---- (8) **obtusus** Horn.
    Pronotum not deeply depressed on disk nor along lateral margins; scutellum transversely carinate ---- (9) **difficilis** Gory.
12. Head concave or deeply depressed ---- 13.
    Head not concave nor deeply depressed ---- 15.
13. Front of head concave or very deeply depressed, the concavity extending to the lateral margins and epistoma; large species, 12 millimeters ---- 14.
    Front of head with a narrow depression on the vertex and occiput, but the depression not extending to the lateral margins; small species, 5–6 millimeters ---- (10) **cupricollis** Gory
14. Sides of pronotum densely clothed with orange yellow pubescence, and the median depression not interrupted at the middle.
    (11) **cupreomaculatus** Dugés.
    Sides of pronotum not densely pubescent, and the median depression interrupted at the middle ---- (12) **fuscipennis** Gory.

---

[1] Check List of the Forest Trees of the United States, Their Names and Ranges (U. S. Dept. Agric., Miscellaneous Circ. 92, 1927, pp. 1–295).

15. Vertical portions of abdominal segments, and abdomen beneath with distinct pubescent spots---------------------------------------(9) **difficilis** Gory.

Vertical portions of abdominal segments without distinct pubescence spots, but sometimes uniformly clothed with pubescence over entire surface; abdomen beneath without distinct pubescent spots------------------ 16.

16. Claws on anterior tarsi with the inner teeth distinctly separated at the tips-- 17.

Claws on anterior tarsi with the inner teeth contiguous or nearly contiguous at the tips-- 19.

17. Body above distinctly, sparsely, uniformly pubescent; elytra with distinct costae--(13) **townsendi** Fall.

Body above not distinctly pubescent; elytra without distinct costae---- 18.

18. Male with the claws on anterior tarsi feebly cleft, the inner tooth distinctly broader than outer one, and broad toward apex. Host plants: Madrone or manzanita---(14) **arbuti** Fisher.

Male with the claws on anterior tarsi deeply cleft, the inner tooth not distinctly broader than outer one, and acute at apex. Host plant: Oak.

(15) **angelicus** Horn.

19. Male with anterior and middle tibiae armed with a distinct tooth on inner margin at apex--- 20.

Male with all tibae armed with a distinct tooth on inner margin at apex- 23.

20. Posterior tarsi of male shorter than tibiae, the first joint as long as the following three joints united-- 21.

Posterior tarsi of male as long, or longer than tibiae, the first joint as long as the following four joints united----------------(16) **masculinus** Horn.

21. Elytra sparsely, uniformly clothed with distinct whitish pubescence.

(17) **albocomus** Fisher.

Elytra without distinct pubescence------------------------------------ 22.

22. Elytra with vague pubescent vittae.

(18) **paramasculinus** Champlain and Knull.

Elytra without pubescent vittae---------(19) **arcuatus** (Say) and subspecies.

23. Male with antennae longer than pronotum, slender, and ciliate beneath with long hairs--(20) **crinicornis** Horn.

Male with antennae not longer than pronotum, and not ciliate beneath-- 24.

24. Male with the last ventral abdominal segment truncate and fimbriate at apex---(21) **defectus** LeConte.

Male with the last ventral abdominal segment not fimbriate at apex---- 25.

25. Male with the prosternum conspicuously pubescent-------------------- 26.

Male with the prosternum not conspicuously pubescent---------------- 28.

26. Male genitalia with the sides arcuately expanded--------------------- 27.

Male genitalia with the sides parallel---------------(22) **geminatus** (Say).

27. Male with front of head densely clothed with long, white hairs behind epistoma, and nearly concealing the surface; sides of male genitalia not transparent at apex. Host plant: Hickory-------------(23) **otiosus** Say.

Male with front of head sparsely clothed with white hairs behind epistoma; sides of male genitalia broadly transparent toward the apex. Host plant: Probably hazel-----------------------------------(24) **atricornis** Fisher.

28. Male with the second abdominal segment transversely concave, and causing the body to be bent downward. Host plant: Black walnut.

(25) **transimpressus** Fall.

Male with the second abdominal segment not transversely concave------ 29.

29. Male with the first and second abdominal segments feebly, longitudinally flattened at middle; sides of male genitalia strongly, arcuately expanded near apex. Host plant: Oak----------(26) **frosti** Knull.
Male with the first and second abdominal segments not flattened at middle; sides of male genitalia strongly, arcuately expanded near middle, and parallel toward apex. Host plant: Butternut------(27) **juglandis** Knull.
(?) (28) **puncticeps** LeConte.

30. Pygidium with a projecting carina---------- 31.
Pygidium without a projecting carina---------- 57.

31. Elytra with a distinct longitudinal costa on each elytron---------- 32.
Elytra without, or with only a vague longitudinal costa on each elytron-- 33.

32. Scutellum transversely carinate; tips of elytra narrowly rounded.
(29) **macer** LeConte.
Scutellum not transversely carinate; tips of elytra acute.
(2) **nevadensis** Horn.

33. Elytra bicolored, bronzy or reddish cupreous, with a greenish or purplish sutural vitta common to both elytra----------(30) **pulchellus** Bland.
Elytra unicolored ---------- 34.

34. Pronotum with the sides and median part densely pubescent---------- 35.
Pronotum without a densely pubescent median vitta, but sometimes the sides are pubescent, especially anteriorly---------- 37.

35. Propleurae, mesopleurae, metapleurae, and coaxe densely pubescent; sides of prosternal process not bent downward near apex---------- 36.
Propleurae, mesopleurae, metapleurae, and coxae not densely pubescent; sides of prosternal process usually bent downward and forming a tooth near apex----------(31) **vittaticollis** (Randall).

36. Head deeply depressed in front, and the lower half densely pubescent; male with only an obsolete depression on second abdominal segment.
(32) **benjamini** Fisher.
Head moderately depressed in front, and rather densely pubescent over entire surface; male with a deep, smooth, elongate depression on second abdominal segment----------(33) **audax** Horn.

37. Pronotum without, or with only feebly indicated prehumeral carinae 38.
Pronotum with distinct prehumeral carinae---------- 47.

38. Elytra with pubescent spots or vittae---------- 39.
Elytra without pubescent spots or vittae---------- 41.

39. Elytra with pubescent spots----------(34) **pilosicollis** Fisher.
Elytra with pubescent vittae (sometimes only indicated in basal depressions)---------- 40.

40. Elytra black, with a more or less distinct whitish or yellowish pubescent vittae on each elytron----------(35) **bilineatus** (Weber).
Elytra blue, or bluish black, with only indications of the pubescent vittae in the basal depressions-------(35*a*) **bilineatus** subspecies **carpini** Knull.

41. Species distinctly bicolored; head and pronotum green, with a cupreous or aureous tinge; elytra black, with a feeble greenish or violaceous reflection.
(36) **quercicola** Fisher.
Species unicolored, dark blue, black, or olivaceous, frequently with a greenish or bluish tinge. (Somtimes the head and pronotum is vaguely more aeneous)---------- 42.

42. Vertical portions of the abdominal segments densely pubescent, except sometimes the second---------- 43.
Vertical portions of the abdominal segments not conspicuously pubescent; male with the tarsal claws similar on all feet--------(37) **criddlei** Frost.

43. Elytra with distinct, uniformly distributed, short, white pubescence. (38) **olivaceoniger** Fisher.

Elytra without distinct pubescence, except sometimes for a few white hairs along the sutural margins near apex------------------------------ 44.

44. Vertical portions of second abdominal segment glabrous-------------- 45.

Vertical portions of second abdominal segment more or less pubescent-- 46.

45. Above dark blue to bluish black; tips of elytra rather broadly rounded, rarely acute------------------------------(39) **acutipennis** Mannerheim.

Above aeneous to olivaceous black; tips of elytra more acutely rounded; pronotum more deeply depressed at middle anteriorly. (40) **auricomus** Frost.

46. Elytra with the tips usually broadly rounded; pubescence on abdomen and vertical portions of abdominal segments white or yellowish white. (41) **quadriimpressus** Ziegler.

Elytra with the tips more acutely rounded; pubescence on abdomen and vertical portions of abdominal segments usually golden yellow. (40) **auricomus** Frost.

47. Vertical portions of abdominal segments (except sometimes the second) conspicuously pubescent-- 48.

Vertical portions of all abdominal segments uniformly, but not conspicuously pubescent-- 50.

48. Prosternal lobe broadly subtruncate in front; elytra black, with six very distinct golden yellow pubescent spots---------(42) **auroguttatus** Schaeffer.

Prosternal lobe emarginate in front; elytra brownish black, with a more or less distinct aeneous or cupreous tinge, and with six feebly indicated pubescent spots, some of which are frequently obsolete------------- 49.

49. Front of head densely pubescent, the pubescence nearly obscuring the surface; elytra with the tips rather broadly rounded--(43) **granulatus** (Say).

Front of head not densely pubescent, the surface distinctly visible; elytra with the tips acute, or narrowly rounded-------(44) **quadriguttatus** Gory.

50. Elytra with pubescent spots, usually only feebly indicated---------- 51.

Elytra without pubescent spots--------------------------------------- 54.

51. Scutellum transversely carinate; tips of elytra narrowly or rather acutely rounded--- 52.

Scutellum not transversely carinate; tips of elytra very acute. (2) **nevadensis** Horn.

52. Above feebly shining or subopaque; sides of abdomen beneath broadly, densely, uniformly pubescent. Host: Willow------(45) **niveiventris** Horn.

Above strongly shining-- 53.

53. Sides of abdomen beneath sparsely pubescent, the pubescence forming more or less distinct spots; male with the first abdominal segment flattened, and the second with a vaguely depressed smooth median space on basal half. Host: Willow----------------------------(46) **fulminans** Fisher.

Sides of abdomen beneath very sparsely pubescent, the pubescence not forming spots; male with the first abdominal segment feebly concave, and the second with a broad, moderately deep, smooth depression at the middle. Host: Poplar-------------------------------------(47) **populi** Fisher.

54. Male with the front of head densely pubescent, nearly concealing the surface. (48) **betulae** Fisher.

Male with the front of head not densely pubescent, the surface distinctly visible--- 55.

55. Above uniformly dark reddish cupreous----------------(49) **pensus** Horn.

Above olivaceous black to bluish gray------------------------------ 56.

56. Male with the first and second abdominal segments each with a deep, smooth, median groove---------- (50) **horni** Kerremans.

Male with the first abdominal segment broadly, longitudinally concave at middle, and the bottom of the concavity roughly sculptured; second segment with a deep, smooth groove at middle---------- (51) **anxius** Gory.

57. Pronotum with a broad, deep, median depression extending from base to near apex---------- 58.

Pronotum without a deep median depression extending from base to apex, at most with a narrow, or moderately deep, broad depression at middle---------- 61.

58. Elytra with pubescent markings---------- 59.

Elytra without pubescent markings---------- 60.

59. Scutellum transversely carinate; elytral costae feebly indicated and not entire; prosternal lobe not emarginate in front---------- (52) **cavatus** Chevrolat.

Scutellum not transversely carinate; elytral costae distinct, and extending nearly to apex; prosternal lobe emarginate in front.
(53) **aureus** Chevrolat.

60. Sides of pronotum densely pubescent; elytra dull olivaceous bronze or black, with bronzy green vittae---------- (54) **concinnus** Horn.

Sides of pronotum not densely pubescent; elytra uniformly purplish black (male), or reddish cupreous (female)---------- (55) **restrictus** Waterhouse.

61. Suture between first and second abdominal segments distinctly indicated at the sides---------- 62.

Suture between first and second abdominal segments entirely obliterated, or at most, only vaguely indicated at the sides---------- 67.

62. Elytra bicolored, bronzy or reddish cupreous, with a greenish or purplish sutural vitta common to both elytra---------- (30) **pulchellus** Bland.

Elytra unicolored---------- 63.

63. Elytra with pubescent spots---------- (56) **walsinghami** Crotch.

Elytra without pubescent spots, but sometimes uniformly pubescent---------- 64.

64. Elytra with distinct pubescence; head not deeply (at most only moderately) depressed in front---------- 65.

Elytra without distinct pubescence; head deeply depressed in front.
(57) **inhabilis** Kerremans.

65. Form very robust; pronotum evenly convex and without depressions; elytra without costae; antennae with the outer joints transverse.
(58) **snowi** Fall.

Form normal; pronotum with depressions; elytra with costae; antennae with the outer joints not transverse---------- 66.

66. Pronotum distinctly wider than long; pygidium vaguely longitudinally carinate---------- (59) **costipennis** Fisher.

Pronotum not wider than long; pygidium distinctly longitudinally carinate.
(60) **baboquivariae** Fisher.

67. Scutellum not distinctly transversely carinate---------- 68.

Scutellum transversely carinate---------- 70.

68. Above bicolored; head and pronotum cupreous, sometimes with a bluish green tinge; elytra black or bluish black---------- (61) **huachucae** Schaeffer.

Above unicolored---------- 69.

69. Second and third abdominal segments slightly arcuately prolonged at middle over the following segments; elytra with vague subsutural pubescent vittae---------- (62) **ventralis** Horn.

Second and third abdominal segments not prolonged at middle over the following segments; elytra without subsutural pubescent vittae.
(63) **obolinus** LeConte.

70. Elytra with pubescent spaces or designs ---------- 71.

Elytra without pubescent spaces ---------- 75.

71. Pronotum with distinct prehumeral carinae ---------- 72.

Pronotum without distinct prehumeral carinae ---------- 74.

72. Prosternal lobe deeply emarginate in front ---------- 73.

Prosternal lobe not emarginate in front ----------(64) fallax Say.

73. Above bicolored; pronotum aeneous or cupreous, and the elytra piceous, with a more or less distinct purplish tinge ----------(65) scitulus Horn.

Above unicolored, bronzy black to olivaceous brown, and sometimes with a feeble purplish tinge ----------(66) obsoletoguttatus Gory.

74. Pronotum and elytra bronzy brown, shining, the former more or less cupreous, the latter sometimes violaceous posteriorly, with the anterior pubescent design entire, and longitudinally arcuate.
(67) lautuellus Fisher.

Pronotum and elytra piceous, the former subopaque, the latter shining, with a more or less bluish or violaceous tinge, and the anterior pubescent design strongly interrupted ----------(68) ornatulus Horn.

75. Pronotum with the sides and median part densely pubescent.
(69) dozieri Fisher.

Pronotum with the sides and median part not conspicuously pubescent -- 76.

76. Anterior tarsal claws with the inner teeth feebly turned inward, but their tips broadly separated ---------- 77.

Anterior tarsal claws with the inner teeth not turned inward ---------- 79.

77. Body above distinctly, sparsely, uniformly pubescent; elytra with distinct costae ----------(13) townsendi Fall.

Body above not distinctly pubescent; elytra without distinct costae ----- 78.

78. Male with the claws on anterior tarsi feebly cleft, the inner tooth distinctly broader than outer one, and broad toward apex. Host plants: Madrone and manzanita ----------(14) arbuti Fisher.

Male with the claws on anterior tarsi deeply cleft, the inner tooth not distinctly broader than outer one, and acute at apex. Host plant: Oak.
(15) angelicus Horn.

79. Antennae with the outer joints (seven to eleven) distinctly wider than long.
80.

Antennae with the outer joints (seven to eleven) not distinctly wider than long ---------- 81.

80. Prosternal lobe broadly rounded in front. Host plant: Galls on rose.
(70) viridis var. fagi (Ratzeburg).

Prosternal lobe subtruncate, or more or less emarginate in front. Host plants: Willow, maple, hazel, and alder.
(71) politus (Say) and subspecies.

81. Prosternal lobe deeply emarginate in front ---------- 82.

Prosternal lobe broadly, but not deeply emarginate in front ---------- 83.

82. Above uniformly reddish cupreous, with a violaceous tinge; form elongate and rather strongly attenuate posteriorly; prosternal lobe with a semicircular emargination in front; prehumeral carinae sharply defined. Host plant: Pear ----------(72) sinuatus (Olivier).

Above uniformly greenish blue; form short and not strongly attenuate posteriorly; prosternal lobe broadly, deeply emarginate in front; prehumeral carinae not sharply defined ----------(73) coeruleus (Rossi).

83. Large species (6–8 millimeters); inner tooth of tarsal claws long and acute; male genitalia with the sides arcuately expanded. Host plant: Crataegus ----------(74) crataegi Frost.

Small species (4.5–5.75 millimeters); inner tooth of tarsal claws short and broad; male genitalia slender, with the sides parallel to each other. Host plant: Dogwood ------ (75) **cephalicus** LeConte.

84. Tarsal claws cleft in such a manner that the inner portion is turned inward, nearly or quite touching that of the opposite side ------ (76) **strigicollis** Fall.

Tarsal claws simply cleft, the inner portion not or only feebly turned inward and the tips distant ------ 85.

85. Upper surface with pubescent spots, vittae, or irregular designs ------ 86.

Upper surface sometimes uniformly pubescent, but the pubescence not forming spots, vittae, or irregular designs ------ 121.

86. Pronotum distinctly gibbose; each elytron with a longitudinal pubescent vitta along the sutural margin ------ (77) **gibbicollis** Fall.

Pronotum not gibbose ------ 87.

87. Pronotum with prehumeral carinae (sometimes only vaguely indicated). 88.

Pronotum without prehumeral carinae ------ 117.

88. Elytra with more or less distinct pubescent spots or vittae ------ 89.

Elytra with more or less distinct irregular pubescent designs ------ 113.

89. Elytra with longitudinal pubescent vittae along the sutural margins ------ 90.

Elytra with rounded or elongate pubescent spots ------ 102.

90. Front of head convex, or at most, with a shallow longitudinal groove ------ 91.

Front of head distinctly depressed and more or less concave ------ 97.

91. Pronotum vaguely rugose ------ (78) **pubifrons** Fisher.

Pronotum distinctly rugose or scabrous ------ 92.

92. Pronotum finely, transversely rugose ------ 93.

Pronotum coarsely, irregularly rugose, or scabrous ------ 96.

93. Prosternal lobe distinctly emarginate in front. (79) **olentangyi** Champlain and Knull.

Prosternal lobe rounded or subtruncate in front ------ 94.

94. Pronotum with the marginal and submarginal carinae separated for their entire length; pubescent vittae on elytra distinct ------ (80) **mimosae** Fisher.

Pronotum with the marginal and submarginal carinae not separated for their entire length; pubescent vittae on elytra feebly indicated ------ 95.

95. Head convex, at most only vaguely grooved; above piceous, sometimes with a vague cupreous tinge; small species (3–4.25 millimeters); male genitalia with the median lobe broadly rounded at apex ------ (81) **chiricahuae** Fisher.

Head usually rather distinctly grooved; above cupreous brown; large species (5–8 millimeters); male genitalia with the median lobe obtusely angulated at apex ------ (82) **aeneocephalus** Fisher.

96. Pronotum wider than long; pubescent vittae on elytra feebly indicated; male genitalia with a distinct tooth on each side of the median lobe near apex. (83) **malvastri** Fisher.

Pronotum not wider than long; pubescent vittae on elytra distinct; male genitalia without a tooth on the median lobe near apex. (84) **falli** Fisher.

97. Prosternal lobe broadly rounded or subtruncate in front ------ 98.

Prosternal lobe distinctly emarginate in front; elytra with the pubescent vittae obsolete, or the pubescence uniformly distributed except in the humeral regions ------ (79) **olentangyi** Champlain and Knull.

98. Pronotum with more or less distinct median depressions ------ 99.

Pronotum strongly convex, and without median depressions ------ 101.

99. Posterior margin of hind coxae regularly, arcuately emarginate; pubescent vittae on elytra obsolete---------------(82) **aeneocephalus** Fisher.

Posterior margin of hind coxae strongly sinuate; pubescent vittae on elytra moderately distinct--------------- 100.

100. Pronotum strongly depressed at the sides, with the depressions rather densely clothed with long pubescence---------------(85) **illectus** Fall.

Pronotum feebly depressed at the sides, and without distinct long pubescence---------------(86) **sierrae** Van Dyke.

101. Pronotum clothed with distinct long pubescence toward the sides; pubescent vittae on elytra distinct---------------(87) **felix** Horn.

Pronotum not clothed with distinct long pubescence toward the sides; pubescent vittae on elytra obsolete---------------(88) **jacobinus** Horn.

102. Front of head distinctly depressed, and more or less concave--------------- 103.

Front of head convex, or at most, only feebly, longitudinally depressed--------------- 106.

103. Sides of prosternal process parallel to behind the coxal cavities.
(89) **floridanus** Crotch.

Sides of prosternal process expanded behind the coxal cavities--------------- 104.

104. Pubescent spots on elytra distinct, and the basal and median ones separated; large species (6.5–7.5 millimeters)---------------(90) **impexus** Horn.

Pubescent spots on elytra not distinct, often obsolete; small species (4–6 millimeters) --------------- 105.

105. Pronotum with a distinct median depression; basal and median pubescent spots on elytra not connected; head glabrous in both sexes.
(91) **cupreonitens** Fisher.

Pronotum without a distinct median depression; basal and median pubescent spots on elytra usually connected, forming a more or less distinct vitta on basal half; head pubescent in both sexes--(92) **addendus** Crotch.

106. Pronotum with the marginal and submarginal carinae separated for their entire length--------------- 107.

Pronotum with the marginal and submarginal carinae not separated for their entire length--------------- 109

107. Pronotum rather deeply, broadly depressed at middle; pubescence on elytra usually forming irregular designs similar to **lecontei**.
(93) **quercus** Schaeffer.

Pronotum not, or at most, only feebly depressed at the middle--------------- 108.

108. Pronotum finely, distantly, and very obliquely rugose on disk. Male with the front of head bronzy cupreous, and densely clothed with white pubescence; first ventral segment of abdomen broadly grooved at middle, and slightly pubescent. Female with front of head dark reddish brown.
(94) **palmacollis** Horn.

Pronotum rather coarsely transversely rugose on disk. Male with the front of head bright green, and not densely pubescent; first ventral segment of abdomen flattened or vaguely grooved, and not pubescent. Female with the front of head bright reddish mahogany---------------(95) **prosopidis** Fisher.

109. Sides of prosternal process expanded behind the coxal cavities; prosternal lobe broadly rounded or feebly subtruncate in front--------------- 110.

Sides of prosternal process parallel to behind the coxal cavities; prosternal lobe more or less emarginate in front--------------- 112.

110. Pubescent spots on elytra distinct, the median one elongate, and placed in a distinct depression--------------- 111.

Pubescent spots on elytra indistinct, and the median one usually not in a depression---------------(96) **exiguellus** Fisher.

111. Pronotum finely, transversely rugose on disk, and the sides parallel or obliquely narrowed from apical angles to behind middle; epistoma deeply, arcuately emarginate in front---------------(97) **acaciae** Fisher.
Pronotum coarsely, transversely rugose on disk, and the sides arcuately rounded to behind the middle; epistoma feebly, arcuately emarginate in front---(98) **abductus** Horn.

112. Pubescent spots on elytra distinct, and the median one rounded; pronotum with distinct median depressions; female with the front of head mahogany red; male genitalia with the sides nearly parallel to each other---(99) **pseudofallax** Frost.
Pubescent spots on elytra usually not distinct, and the median one elongate; pronotum with feeble median depressions; female with front of head bronzy green; male genitalia with the sides strongly expanded near apex--------------------------(100) **egeniformis** Champlain and Knull.

113. Tips of elytra emarginate-----------------------------(101) **dolli** Schaeffer.
Tips of elytra not emarginate-- 114.

114. Prosternal lobe broadly rounded in front---------------------------- 115.
Prosternal lobe deeply, arcuately emarginate in front---------------- 116.

115. Sides of prosternal process parallel to behind the coxal cavities.
(93) **quercus** Schaeffer.
Sides of prosternal process expanded behind the coxal cavities.
(98) **abductus** Horn.

116. Male with claws on anterior feet dissimilar, one claw cleft near tip and the teeth nearly equal in length, the opposite claw cleft near middle, with the inner tooth broader and distinctly shorter than outer one.
(102) **lecontei** Saunders.
Male with claws on anterior feet similar, both claws cleft near tip, and the two teeth about equal in length.
(102*a*) **lecontei** subspecies **celticola** Fisher.

117. Pronotum slightly gibbose; each elytron with a longitudinal pubescent vitta along the sutural margin--------------------------(77) **gibbicollis** Fall.
Pronotum not gibbose--- 118.

118. Sides of prosternal process expanded behind the coxal cavities; each elytron with three obsolete pubescent spots----------------------- 119.
Sides of prosternal process parallel to behind the coxal cavities------ 120.

119. Pronotum strongly convex, with only an obsolete depression on disk; color above brownish black; large species (6–7 millimeters).
(103) **abjectus** Horn.
Pronotum moderately convex, with a distinct, elongate, median depression; color above brownish or reddish cupreous; small species (4.75 millimeters)--------------------------------------(91) **cupreonitens** Fisher.

120. Pronotum strongly convex, without a median depression; each elytron with a longitudinal pubescent vitta and basal spot-------(104) **blandus** Horn.
Pronotum moderately convex, with distinct median depressions; elytra with distinct pubescent designs----------------(105) **subcinctus** Gory.

121. Elytra with a longitudinal carina between the humeri and lateral margins-- 122.
Elytra without a longitudinal carina between the humeri and lateral margins; color plumbeus---------------------------(106) **muticus** LeConte.

122. Pronotum with prehumeral carinae----------------------------------- 123.
Pronotum without prehumeral carinae--------------------------------- 133.

123. Hind coxae with the posterior margin distinctly sinuate or arcuately emarginate, and with the outer posterior angle more or less acute and somewhat prolonged-- 124.

Hind coxae with the posterior margin feebly sinuate or truncate, with the outer posterior angle rectangular, and not prolonged---------- 128.

124. Male with the first and second abdominal segments longitudinally concave at middle, and densely clothed with long pubescence-------------- 125.

Male with the first and second abdominal segments convex or feebly flattened at middle, and not clothed with conspicuous pubescence----- 127.

125. Posterior tarsi of male distinctly longer than tibiae; eyes more acutely rounded beneath than above------------------(107) **lacustris** LeConte.

Posterior tarsi of male not longer than the tibiae------------------ 126.

126. Prosternal lobe broadly rounded in front; eyes about evenly rounded above and beneath; antennae with the outer joints (seven to eleven) not longer than wide------------------------------(108) **imbellis** Crotch.

Prosternal lobe broadly, arcuately emarginate in front; eyes more acutely rounded beneath than above; antennae with the outer joints (seven to eleven) longer than wide-------------------------(109) **barberi** Fisher.

127. Front of head broadly, rather deeply depressed; pronotum with the marginal and submarginal carinae separated for their entire length.
(86) **sierrae** Van Dyke.

Front of head not broadly, deeply depressed; pronotum with the marginal and submarginal carinae not separated for their entire length.
(110) **abditus** Horn.

128. Elytra sparsely, uniformly clothed with distinct white hairs, except sometimes in the humeral regions------------------------------------ 129.

Elytra not clothed with distinct white hairs---------------------- 130.

129. Prosternal lobe distinctly emarginate in front.
(79) **olentangyi** Champlain and Knull.

Prosternal lobe broadly rounded or subtruncate in front.
(111) **pubescens** Fisher.

130. Surface above bicolored; head and pronotum aeneous or cupreous; elytra purplish black----------------------------------(112) **pusillus** (Say).

Surface above unicolored, brownish or greenish bronze----------- 131.

131. Pronotum slightly narrower at base than apex, and the surface coarsely, transversely rugose-- 132.

Pronotum equal in width at base and apex, and the surface very finely, distantly, obliquely rugose---------------------(113) **eleanorae** Fisher.

132. Male genitalia with the sides nearly parallel to each other. Host plant: Hackberry---------------------------------------(114) **celti** Knull.

Male genitalia with the sides very strongly, arcuately expanded. Host plant: Black locust---------------------------------(115) **egenus** Gory.

133. Hind coxae with the posterior margin distinctly sinuate or arcuately emarginate, with the outer posterior angle more or less acute, and somewhat prolonged-- 134.

Hind coxae with the posterior margin feebly sinuate or truncate, with the outer posterior angle rectangular, and not prolonged------------- 135.

134. Posterior tarsi of male distinctly longer than tibiae; eyes more acutely rounded beneath than above------------------(107) **lacustris** LeConte.

Posterior tarsi of male not longer than the tibiae; eyes about evenly rounded above and beneath----------------------(108) **imbellis** Crotch.

135. Scutellum transversely carinate: pronotum transversely rugose and punctate--- 136.

Scutellum not transversely carinate; pronotum very obliquely rugose, and somewhat granulose--------------------------(116) **abstersus** Horn.

136. Prosternal lobe distinctly emarginate in front; eyes acutely rounded beneath -- (117) **putillus** Say.
Prosternal lobe broadly rounded in front; eyes broadly rounded beneath. (118) **oblongus** Fisher.

DESCRIPTION OF SPECIES

1. AGRILUS FERRISI Dury

Figure 1

Agrilus ferrisi Dury, Ent. News, vol. 19, 1908, p. 368.—Blatchley, Coleoptera of Indiana, 1910, pp. 797–798.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 204.—Blackman and Stage, N. Y. State College Forestry, Tech. Pub. 17, pt. 1, 1924 p. 66.—Chamberlin Cat. Buprestidae, 1926 p. 62.

Male.—Form rather large, strongly flattened above, strongly shining, and uniformly aeneous, with a strong reddish cupreous or violaceous tinge; beneath reddish cupreous, and more shining than above.

Head with the front rather wide, nearly flat, about equal in width at top and bottom, the lateral margins feebly, arcuately expanded near middle, and with a feeble longitudinal groove extending from occiput to middle of front; surface coarsely punctate, more or less longitudinally rugose on the occiput, and the surface nearly concealed by the long, recumbent, yellowish white pubescence and efflorescence; epistoma strongly transverse between the antennae, strongly elevated, and broadly, deeply, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fourth joint, and the outer serrate joints as wide as long; eyes large, elongate, and about equally rounded beneath and above.

Pronotum nearly one-half wider than long, base and apex about equal in width, and widest at middle; sides feebly, arcuately rounded, and slightly sinuate near posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are slightly sinuate, very narrowly separated, and connected to each other at base; anterior margin slightly sinuate with a broadly rounded median lobe; base feebly emarginate at middle of each elytron, and the median lobe feebly, broadly rounded; disk moderately convex, with a vague, longitudinal median depression, which is more broadly depressed in front of scutellum, a broad, shallow depression on each side along lateral margin, and with obtusely rounded, arcuate, prehumeral carinae, extending from base to near middle of pronotum; surface coarsely, transversely rugose at middle, sparsely, coarsely punctate between the rugae, and sparsely clothed with short, inconspicuous hairs at the middle, but the surface at sides concealed by long, recumbent, yellowish white pubescence and efflorescence. Scutellum strongly, transversely carinate, and the surface nearly smooth.

Elytra wider than pronotum at base, and slightly wider at base than behind middle; sides nearly parallel for a short distance behind base, broadly, vaguely constricted in front of middle, feebly, broadly expanded behind middle, then obliquely narrowed to the tips, which are strongly serrulate, and produced into an acute spine at middle of each elytron; sides of abdomen broadly exposed above; disk flattened, feebly, longitudinally concave along sutural margins, which are feebly elevated posteriorly, a feeble, obtuse costa on each elytron, and with wide, rather deep basal depressions; surface coarsely, irregularly imbricate-punctate, more or less transversely rugose, and sparsely clothed with very short, inconspicuous hairs.

Abdomen beneath finely, sparsely punctate, the punctures more or less connected transversely by sinuate lines, which are coarser at the sides of the first two basal segments, sparsely clothed with short, inconspicuous hairs, sides of basal segment, and a large spot at sides of other segments densely clothed with long, recumbent, yellowish white pubescence and efflorescence; first segment convex at middle, and without long pubescence; last segment broadly, transversely truncate at apex, and with a marginal groove extending along sides and apex; vertical portion of segments densely pubescent and efflorescent; pygidium longitudinally carinate, the carina not projecting, but the tip of the pygidium is broadly projecting, and strongly emarginate at apex. Prosternum finely, sparsely punctate and granulose, and sparsely clothed with long, erect, fine hairs; prosternal lobe broad, moderately declivous, and broadly, rather deeply, arcuately emarginate in front; prosternal process broad, the sides nearly parallel to behind coxal cavities, then obliquely rounded to the apex, which is obtusely rounded. Tibiae slender, the anterior pair feebly arcuate, and the anterior and middle pairs armed with a short, indistinct tooth on inner margin at apex. Posterior tarsi about equal in length to the tibiae, and the first joint nearly as long as the following joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, much shorter than the outer one, and not turned inward.

Length, 8.75 mm.; width, 2.25 mm.

Female.—Differs from the male in having the front of head more deeply depressed, and the longitudinal groove more distinct; prosternum more or less rugose, and without long, erect hairs at middle; tibiae unarmed at apex; last abdominal segment strongly granulose, more broadly truncate at apex, and the marginal groove only present at sides.

Length, 10 mm.; width, 2.75 mm.

Redescribed from a male and female cotype donated to the United States National Museum by Mr. Dury.

Type locality.—Cincinnati, Ohio.

DISTRIBUTION

INDIANA: Warren and Posey Counties, June 9 to July 23 (recorded by Blatchley, 1910).
IOWA: Ames, June 26 (L. S. Wells).
KENTUCKY: Louisville (Chas. Schaeffer).
MISSISSIPPI: No definite locality, reared (M. W. Blackman).
OHIO: Cincinnati, June–July (Chas. Dury). Columbus, July 6–August 19 (J. N. Knull).
TEXAS: Columbus, June 17 (——). Gainesville, June 17 (E. E. Russell).

Variations.—This species varies from 8.75 to 10 millimeters in length. The examples from Texas are more uniformly bronzy brown, and without any purplish tinge, the pubescence on the elytra is slightly more distinct, and the surface of the pronotum is more strongly, transversely rugose. In the specimens from Texas and Iowa the tips of the elytra are not very strongly prolonged, and the projection of the pygidium is truncate at the apex, whereas in the specimens from the type locality the carina is deeply emarginate. The example from Columbus, Tex., has the pubescence on the sides of the pronotum and abdomen of a distinct yellow color.

Host.—The larvae of this species live in the twigs of hackberry (*Celtis occidentalis* Linnaeus).

2. AGRILUS NEVADENSIS Horn

Agrilus nevadensis HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 303–304.—SCHAEFFER, Brooklyn Inst. Mus., Sci. Bull., vol. 1, no. 6, 1905, p. 131.—CHAMBERLIN, Ent. News, vol. 28, 1917, p. 169 (probably wrong identification).—GOOD, Ann. Ent. Soc. Amer., vol. 18, 1925, p. 272, pl. 11, fig. 45 (probably wrong identification).—CHAMBERLIN, Cat. Buprestidae, 1926, p. 71 (in part).—ESSIG, Insects Western North Amer., 1926, p. 403 (probably wrong identification).

Female.—Form large, elongate, strongly flattened above, subopaque, uniformly black, with a more or less greenish and violaceous tinge, the violaceous tinge more distinct on front of head; beneath strongly violaceous on the median parts, with a greenish tinge toward the sides, and more shining than above.

Head with the front wide, nearly flat, about equal in width at top and bottom, the lateral margins feebly, arcuately expanded near vertex, and with a rather broad, shallow depression extending from the occiput to middle of front; surface rather densely, coarsely, transversely rugose, sparsely, coarsely punctate between the rugae, with a vague fovea on each side of the middle, and sparsely clothed with moderately long, semierect, whitish hairs; epistoma transverse between the antennae, and broadly, deeply arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints about as long as wide; eyes large, strongly elongate, and slightly more acutely rounded beneath than above.

Pronotum one-half wider than long, apex and base about equal in width, and widest at middle; sides arcuately rounded from apical angles to near the base, where they are more obliquely narrowed; when viewed from the side the marginal and submarginal carinae are feebly sinuate, rather narrowly separated anteriorly, and connected to each other at or near the base; anterior margin feebly sinuate, and the median lobe feebly, broadly rounded; base broadly, arcuately emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, with a broad, shallow median depression, which is more or less divided at the middle, a broad shallow depression on each side along lateral margin, and with sharply defined, arcuate prehumeral carinae; surface with numerous coarse, transverse punctures, the punctures irregularly placed, and rather widely separated on the disk, and clothed with a few short, inconspicuous hairs toward the sides. Scutellum not transversely carinate, but the surface triangularly depressed.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, feebly narrowed to behind middle, where they are feebly, broadly expanded, then obliquely narrowed to the tips, which are separately, very acutely angulated, slightly prolonged, and coarsely serrulate; sides of abdomen broadly exposed above; disk slightly flattened, a vague, broad, longitudinal costa on each side, sutural margins slightly elevated on apical half, and with broad, moderately deep basal depressions; surface coarsely, vaguely imbricate-punctate, more or less transversely rugose, and sparsely clothed with short, whitish hairs on apical third, the hairs being more distinct in a vague depression toward apex, and feebly indicated at middle.

Abdomen beneath nearly smooth on the median part, becoming finely, densely punctate at the sides, and sparsely clothed with short, recumbent, whitish pubescence; first segment vaguely flattened at middle; last segment broadly rounded at apex; vertical portions of segments rather densely, but not conspicuously pubescent; pygidium coarsely punctate, strongly carinate, the carina strongly projecting, and truncate at apex. Prosternum densely, finely punctate, and rather densely clothed with short, recumbent, whitish pubescence; prosternal lobe broad, moderately declivous, and broadly but not deeply, arcuately emarginate in front, forming an arcuately rounded lobe on each side of the emargination; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, straight, and without a distinct tooth on the inner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws cleft near the middle, the inner tooth shorter than outer one, feebly turned inward, but the tips widely separated. (Posterior claws missing.)

Length, 10.5 mm.; width, 2.75 mm.

Male.—Unknown.

Type locality.—Western Nevada.

Redescribed from the type No. 3479 in the collection of the Academy of Natural Sciences, Philadelphia.

This species seems to be rare in collections, as only the unique type collected by Morrison has been seen by the writer. Chamberlin (1917, 1926) records it from the following localities in California: Cole, Tulare County, Yosemite Valley, and Redwood City, as breeding in Aspen (*Populus tremuloides* Michaux), and Black cottonwood (*Populus trichocarpa* Hooker), but these records probably refer to my new species *populi.* Good (1925) gives a drawing of the wing of this species, which is probably made from an erroneously identified specimen.

The depressions at middle and apical third of elytra on the type are only vaguely indicated, and can scarcely be considered as depressions. Horn (1891) in his description writes that the claws are similar on all feet, but they are missing from the posterior feet on the type.

3. AGRILUS SUBTROPICUS Schaeffer

Figure 2

Agrilus subtropicus Schaeffer, Brooklyn Inst. Mus., Sci. Bull., vol. 1, no. 6, 1905, p. 131.—Frost and Weiss, Canad. Ent., vol. 53, 1921, p. 72.—Chamberlin, Cat. Buprestidae, 1926, p. 83.

Male.—Elongate, cuneiform, rather strongly flattened above, feebly shining, black, with a distinct brassy or bluish green tinge, and the elytra more or less cupreous toward the apex; beneath aeneous or cupreous, and more shining than above.

Head with the front rather wide, nearly flat, and slightly narrower at top than at bottom, the lateral margins feebly narrowed from bottom to top, and with a rather deep, longitudinal groove extending from the epistoma to occiput, the groove more broadly depressed behind the epistoma and on the vertex; surface coarsely, and rather densely punctate, and sparsely clothed with long, recumbent, yellowish white hairs; epistoma strongly transverse between the antennae.

and broadly, deeply, arcuately emarginate in front; antennae slender, extending slightly beyond middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes large, elongate, and about equally rounded above and beneath.

Pronotum one-third wider than long, base and apex about equal in width, and widest near middle; sides feebly arcuately rounded, and when viewed from the side the marginal and submarginal carinae are slightly sinuate, narrowly separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, with a broadly rounded, median lobe; base acutely emarginate at middle of each elytron, the median lobe broadly rounded, and feebly, arcuately emarginate in front of scutellum; disk moderately convex, with a broad, median groove extending from base to apex, and more deeply depressed in front and behind the middle, a broad depression on each side along lateral margin, extending obliquely backward from apical angle to the base at acute emargination, and with sharply defined, straight prehumeral carinae, extending from base to near middle of pronotum; surface rather densely, coarsely punctate, feebly rugose, and sparsely clothed with recumbent yellowish hairs and whitish efflorescence, which are more densely arranged in the depressions. Scutellum transversely carinate, and the surface feebly reticulate.

Elytra slightly wider than pronotum at base, and widest just behind the humeri; sides slightly arcuate behind humeral angle, feebly, arcuately constricted in front of middle, slightly arcuately expanded behind middle, then obliquely narrowed to the tips, which are feebly expanded, strongly serrate, and conjointly broadly, arcuately emarginate at middle; sides of abdomen scarcely visible from above; disk slightly depressed, with a distinct longitudinal costa on each side, a rather deep depression along sutural margin, and with broad, moderately deep basal depressions; surface feebly imbricate-punctate, sparsely clothed with short, recumbent, yellowish white pubescence, except on the longitudinal costae, and with four more or less distinct, denuded spots on each elytron, one near base, one at basal third, a broader one behind the middle extending nearly to lateral margin, and an elongate one along lateral margin near the apex.

Abdomen beneath finely punctate, the punctures rather widely separated on the median part, but becoming denser toward the sides of the segments, and rather densely clothed with recumbent, yellowish white hairs toward the sides; vertical portions of the segments not more densely pubescent than ventral surface; first segment strongly convex and without a median depression; pygidium longitudinally carinate at the middle, but the carina not projecting.

Prosternum finely, very densely punctate, and the median part densely clothed with long, erect, inconspicuous hairs; prosternal lobe slightly declivous, broadly rounded in front, and with a broadly arcuate emargination at the middle; prosternal process broad, the sides parallel to behind the coxal cavities, and the apex broadly rounded. Posterior coxae with the posterior margin sinuate and the exterior angle rectangular. Tibiae slender, the anterior and middle pairs slightly arcuate, and with a short tooth on the inner margin at apex. Posterior tarsi about as long as the tibiae, and the first joint as long as the following three joints united. Tarsal claws dissimilar; anterior pair cleft near apex, the teeth nearly equal in length, and acute at the tips; middle and posterior pairs cleft near middle, the outer tooth long and acute, the inner tooth broad at apex, about one-half as long as the outer one, and not turned inward.

Length, 7.5 mm.; width, 1.75 mm.

Female.—Differs from the male in having the front of head more cupreous, and not so densely pubescent; antennae extending only to middle of pronotum; prosternum sparsely punctate, and not clothed with long, erect hairs at the middle; sides of abdomen slightly exposed above; anterior and middle tibiae unarmed at apex; posterior tarsi distinctly shorter than tibiae, and the tarsal claws similar on all feet, cleft near middle, the outer tooth long and acute, the inner tooth broad, about one-half as long as the outer one, and not turned inward.

Length, 8.4 mm.; width, 2 mm.

Redescribed from the male and female cotypes, catalogue No. 224, in the collection of the Brooklyn Institute of Arts and Sciences.

Type locality.—Esperanza ranch, Brownsville, Tex.

Distribution.—Texas: Esperanza ranch, Brownsville, May to July (Charles Schaeffer); May 31, 1904 (H. S. Barber). Los Borregos, Brownsville, May 21–24, 1904 (H. S. Barber).

Variations.—This species is rather uniform in coloration and pubescent markings, but sometimes the specimens are covered with a dense white efflorescence, which gives them a different appearance. The antennae are usually serrate from the fifth joint, but occasionally there is a specimen found with the fourth joint feebly serrate, which might cause it to be placed with the species having the antennae serrate from the fourth joint.

It has only been recorded from two localities in the extreme southern part of Texas, and Frost and Weiss (1921) record it as having been collected on *Momisia pallida* Planch. This is one of the low-growing hackberries, and has been placed in the genus *Celtis* by some authors. The shrub is known in Mexico and Texas under various local names, such as: "Granjeno," "granjeno huasteco," "capul," and "garabato."

4. AGRILUS LUCANUS Fall

Agrilus lucanus FALL, Ent. News, vol. 17, 1906, pp. 167–168.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 69.

Male.—Form strongly cuneiform, strongly flattened above, and moderately shining; head and pronotum bronzy brown, with a distinct cupreous tinge; elytra bronzy brown, with a more or less distinct cupreous, bluish, and purplish tinge in certain lights, and ornamented with indistinct brownish yellow pubescent designs; beneath cupreous, and more shining than above.

Head with the front narrow, feebly convex, vaguely narrower at top than bottom, the lateral margins nearly parallel from bottom to near occiput, where they are feebly, arcuately constricted, with a broad, deep depression on upper half, narrowly connected to a deep, triangular depression behind the epistoma, and a round shallow depression on each side at middle of front; surface densely, coarsely punctate, forming short rugae, and sparsely clothed with long, recumbent, yellowish pubescence; epistoma strongly transverse between the antennal cavities, strongly elevated, and broadly, deeply emarginate in front; antennae extending nearly to posterior angles of pronotum, serrate from the fourth joint, joints one to seven longer than wide, and joints eight to ten as wide as long; eyes large, broadly oblong, and about equally rounded above and beneath.

Pronotum one-half wider than long, about equal in width at base and apex, and widest at middle; sides feebly, arcuately rounded from apical angles to the posterior angles, which are rectangular; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina nearly straight, the two carinae broadly separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, and the median lobe feebly, broadly rounded, base feebly emarginate at middle of each elytron, the median lobe broadly rounded, and feebly, arcuately emarginate in front of scutellum; disk moderately convex, with a broad, deep, median depression, the concavity constricted at middle and narrowed in front, a broad, deep depression on each side along lateral margin extending to base, and with strongly defined, arcuate prehumeral carinae extending from posterior angles to middle of pronotum; surface obsoletely granulose, rather coarsely but not closely rugose, the rugae more or less transverse at middle, and becoming oblique toward the sides, finely, sparsely punctate between the rugae, and sparsely clothed with moderately long, recumbent, brownish yellow hairs. Scutellum strongly, transversely carinate, and the surface finely reticulate.

Elytra about as wide as pronotum, and vaguely wider at base than behind middle; sides nearly parallel from base to behind middle, then obliquely narrowed to the tips, which are broad, obliquely, arcuately emarginate internally, and acutely serrulate; sides of abdomen feebly exposed above; disk strongly flattened along suture, the depression limited externally by a distinct longitudinal costa, and with broad, moderately deep, basal depressions; surface coarsely, densely imbricate-punctate, and each elytron ornamented with brownish yellow pubescent designs as follows: a broad, transversely oblique spot at base, a broad diffused fascia at middle, in front of which is an irregular spot, a more distinct, irregular shaped fascia at apical fourth, which is connected narrowly along suture to a small spot near apex.

Abdomen beneath obsoletely granulose, rather sparsely, uniformly punctate, and sparsely, uniformly clothed with short, recumbent, yellowish pubescence; first segment strongly convex, without a median depression; last segment broadly rounded or subtruncate at apex; vertical portions of the segments not conspicuously pubescent; pygidium feebly carinate anteriorly, but the carina not projecting. Prosternum coarsely, densely punctate, somewhat rugose, and densely clothed with long, erect, fine hairs; prosternal lobe feebly declivous, and very broadly arcuately emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then strongly narrowed to the apex. Tibiae slender, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint as long as the following three joints united. Tarsal claws dissimilar, the anterior and middle pairs cleft near the tip, and the teeth nearly equal in length; posterior claws cleft near middle, the inner tooth broader and shorter than outer one, and not turned inward. Genitalia not examined.

Length, 8.5 mm.; width, 2.125 mm.

Female.—Unknown.

Type locality.—El Taste, Lower California.

Redescribed from the type in the collection of H. C. Fall.

The type which was collected by Mr. Beyer is the only example of this species examined, and is very closely allied to *subtropicus* Schaeffer. It differs from *subtropicus*, however, in having the median depression on the pronotum deeper, the anterior part of the depression distinctly narrower than the posterior part, the depression on front of head deeper, the pubescence on upper surface brownish yellow instead of pale yellow, and also by the different arrangement of the pubescent markings on the elytra, which may be more or less abraded in the type of *lucanus*.

5. AGRILUS CHAMPLAINI Frost

Figure 3

Agrilus champlaini FROST, Canad. Ent., vol. 44, 1912, pp. 245–247.—BRITTON, Conn. Agri. Exp. Sta., 12th Ent. Rept. 1913, p. 291, pl. 16, fig. *c*.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 207.—BRITTON, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 244 (listed).—FROST, Canad. Ent., vol. 52, 1920, p. 249.—KNULL, Canad. Ent., vol. 54, 1922, p. 85; Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 39–40, pl. 9, fig. 1.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 56.

Agrilus otiosus FELT, N. Y. State Mus., Bull. 186, 1916, p. 95 (not *otiosus* Say).

Male.—Elongate, rather robust, slightly flattened above, subopaque, and uniformly black, with a feeble purplish tinge; beneath slightly more shining than above, and with a vague aeneous reflection.

Head with the front rather wide, flat, slightly wider at top than at bottom, the lateral margins arcuately expanded near the middle, and with a moderately deep, broad, longitudinal depression extending from occiput to middle of front; surface densely, coarsely punctate, coarsely rugose, especially on vertex and occiput, and sparsely clothed behind the epistoma with short, semierect, whitish hairs; epistoma strongly transverse between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, strongly elongate, and about equally rounded above and beneath.

Pronotum about three-fifths wider than long, about equal in width at base and apex, and widest at middle; sides rather strongly arcuately rounded from anterior margin to posterior angles, which are obtuse; when viewed from the side the marginal carina is sinuate, the submarginal carina nearly straight, the two carinae rather widely separated at apical fourth, and connected to each other near the base; anterior margin slightly sinuate, with the median lobe feebly rounded; base deeply emarginate at middle of each elytron, the median lobe very wide, and broadly subtruncate in front of the scutellum; disk moderately convex, with two round, deep depressions placed transversely in front of middle, a larger, deeper depression in front of scutellum, a broad, rather deep depression on each side along lateral margin at middle, and extending obliquely backward to the base inside of the prehumeral carina, which is rather short, strongly elevated, and obtusely rounded on top; surface coarsely, densely, transversely rugose, the rugae finer and somewhat confused toward the sides, with numerous punctures between the rugae. Scutellum not transversely carinate, but the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, about equal in width at base and just behind the middle, feebly, broadly, arcuately constricted in front of middle, and narrowed from near the middle to the tips, which are separately, broadly rounded, and coarsely serrate; sides of abdomen narrowly exposed above; disk slightly flattened, with vague longitudinal costae, sutural margins slightly elevated posteriorly, and with broad, deep basal depressions; surface densely, coarsely granulate-punctate, and clothed with inconspicuous pubescence at apex.

Abdomen beneath finely, densely punctate, becoming densely imbricate-punctate on basal segment, and rather densely, uniformly clothed with short, recumbent, whitish pubescence; first segment broadly, feebly concave, the second with a deep, smooth groove at the middle, which extends from the anterior margin to behind middle of segment; vertical portions of segments not conspicuously pubescent; pygidium coarsely punctate, with the median carina strongly elevated, narrow, strongly projecting, and truncate at apex. Prosternum coarsely, densely punctate, somewhat rugose posteriorly, and sparsely clothed with short, semierect, whitish hairs; prosternal lobe rather narrow, strongly declivous, and subtruncate or vaguely emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Posterior coxae with the posterior margin transversely sinuate, and the exterior angle nearly rectangular. Tibiae slender, feebly arcuate, and all three pairs armed with a small tooth on the inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint slightly longer than the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth acute at apex, the inner one broader, slightly shorter, turned inward, and the tip nearly touching that of the opposite side.

Length, 8 mm.; width, 2.25 mm.

Female.—Differs from the male in having the front of head slightly wider, the surface more coarsely punctate and less densely pubescent: tibiae unarmed at apex; posterior tarsi shorter; prosternum more sparsely punctured, and the second abdominal segment not grooved at the middle.

Redescribed from the male type in the collection of the Connecticut Agricultural Experimental Station, at New Haven, Conn.

Type locality.—Lyme, Conn.

DISTRIBUTION

CONNECTICUT: Lyme (reared, A. B. Champlain, H. B. Kirk, W. S. Fisher).

NEW YORK: Hudson Falls (——).

PENNSYLVANIA: Harrisburg, June 16 (H. B. Kirk). Dromgold (Sanders and Champlain). York County; Cedar Run; Stephenstown; Perry County (reared, J. N. Knull).

WEST VIRGINIA: French Creek (reared, F. E. Brooks).

Variations.—Length 7 to 8 millimeters. The coloration is rather uniform on the specimens examined, but in some examples the pronotum is widest at the middle, with the sides regularly rounded from the apical angles to the base, whereas in other examples the pronotum is widest near the apical third, and the sides are more obliquely narrowed posteriorly. The depressions on the pronotum are also quite variable, usually the two anterior ones are deep and distinct. but occasionally these depressions are entirely absent.

Host.—Makes galls or conspicuous swelling on the twigs and small branches of living ironwood (*Ostrya virginiana* (Miller) Koch.)

6. AGRILUS RUFICOLLIS (Fabricius)

Figure 4

Buprestis ruficollis Fabricius, Mant. Ins., vol. 1, 1787, p. 184, no. 85.—Gmelin, Linnaeus, Syst. Nat., 13 ed., vol. 1, pt. 4, 1788, p. 1937, no. 96.—Olivier, Entomol., vol. 2, gen. 32, 1790, no. 106, p. 78, pl. 9, fig. 101; Enc. Method., vol. 5, 1790, p. 238, no. 129.—Fabricius, Ent. Syst., vol. 1, pt. 2, 1792, p. 214, no. 121; Syst. Eleuth., vol. 2, 1801, p. 213, no. 152.—Herbst, Nat. Syst. Ins. Käfer, vol. 9, 1801, pp. 249–250, pl. 155, figs. 9*a*, 9*b* (identification?).—Melsheimer, Cat. Ins. Penna., 1806, p. 46, no. 1026.—Schönherr, Syn. Ins., vol. 1, pt. 3, 1817, p. 260, no. 243.—Sturm, Catal. Ins. Sammlung, 1826, p. 105.

Buprestis (*Teres*) *ruficollis* (Fabricius) Harris, New England Farmer, vol. 8, ser. 1, 1829, p. 2–3 (new subgenus).

Agrilus ruficollis (Fabricius) Dejean, Cat. Coleopt., 2 ed. 1833, p. 82; ed. 3, 1837, p. 93.—Say, Trans. Amer. Philos. Soc., vol. 6, new ser., 1836, pp. 161–162.—Mannerheim, Bull. Soc. Imp. Nat. Moscou, vol. 10, no. 8, 1837, p. 109.—Castelnau and Gory, Mon. Bupr., vol. 2, 1838, *Agrilus*, pp. 60–61, pl. 13, fig. 78, addenda p. 7.—Erichson, Wiegmann Arch. für Naturg., vol. 2, 1840, p. 240.—Sturm, Catal. Käfer Sammlung, 1843, p. 63.—Haldeman, Amer. Quart, Journ. Agric. and Sci., vol. 4, no. 8, 1846, pp. 300–301, fig. —; Trans. N. Y. State Agric. Soc. for 1846, vol. 6, 1847, p. 373, fig. 1.—White, Nomenclature Coleopt. Ins. in Brit. Mus., pt. 3, 1848, p. 37.—LeConte, Proc. Acad. Nat. Sci. Phila., vol 9, 1857, p. 9; Say's Writings, vol. 2 (Baillière Bros. ed. 1859; Cassino and Co., ed. 1883), p. 595; Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 243.—Glover, U. S. Dept. Agric. Rept. for 1868 (1869), p. 92, fig. 101.—Riley, Amer. Ent., vol. 2, 1870, p. 128, fig. 90.—Walsh and Riley, Amer. Ent., vol. 2, 1870, pp. 103–104, figs. 68–69.—Pettit, Canad. Ent., vol. 2, 1870, p. 102.—Le Baron, Prairie Farmer, vol. 42, 1871, p. 122.—Glover, Rept. U. S. Comm. Agric. for 1870 (1871), p. 67, fig. 7.—Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 92.—Saunders, Rept. Ent. Soc. Ontario for 1873 (1874), p. 8, figs. 2–4.—Le Baron, 4th Ann. Rept. Ins. Illinois, 1874, pp. 94, 96.—Thomas, 6th Rept. Illinois State Ent., 1877, pp. 114–115.—Perkins, 4th Rept. Vermont Board Agric., 1877, p. 153.—Hoffmeister, Ann. Rept. Iowa State Hort. Soc. for 1877 (1878), p. 244.—Glover, Illustr. N. Amer. Ent., 1878, Coleopt., pl. 11, fig. 4; pl. 41, fig. 9 (no text).—Schwarz, Proc. Amer. Philos. Soc., vol. 17, 1878, p. 452.—Hubbard and Schwarz, Proc. Amer. Philos. Soc., vol. 17, 1878, p. 656.—Lintner, Cultivator and

Country Gentleman, vol. 45, 1880, p. 215.—Zesche and Reinecke, North Amer. Ent. (Buffalo, N. Y.), vol. 1, 1880, p. vii.—Fuller, Amer. Ent., vol. 3, 1880, p. 91, figs. 27–29.—Riley, Amer. Ent., vol. 3, 1880, p. 107.—Treat, Injurious Insects of Farm and Garden, 1882, p. 213, figs. 132–133.—Saunders, Ins. Injurious to Fruit, 1883, pp. 307–308, figs. 316–318.—Harrington, 14th Rept. Ent. Soc. Ontario for 1883 (1884), p. 44.—Horn, Trans. Amer. Ent. Soc., vol. 13, 1886, p. 137.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 1, no. 1, 1888, p. 87.—Blanchard, Entomol. Amer., vol. 5, 1889, p. 32.—Harrington, 20th Rept. Ent. Soc. Ontario for 1889 (1890), p. 51, fig. 31.—Lintner, 43d Rept. N. Y. State Mus. Nat. Hist., 1890, pp. 123–125, fig. 13.—Cook, 29th Rept. Mich. Board Agric., 1890, p. 119.—Lugger, Ann. Rept. Minn. State Hort. Soc., vol. 18, 1890, pp. 169–170, figs. 1–2.—Hopkins, 3d Ann. Rept. W. Va. Agric. Exp. Sta., 1890, pp. 160–163, pl. 12; Insect Life, vol. 3, 1890, pp. 19–20; W. Va. Agric. Exp. Sta., Bull, 15, 1891, pp. 81–84, pl. 1; Insect Life, vol. 3, 1891, p. 435.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 289–290, pl. 8, figs. 12, 15.—Smith, N. J. Agric. Exp. Sta., Special Bull. N. 1891, pp. 4–8, figs. 1–2; Insect Life, vol. 4, 1891, pp. 27–29, 232; vol. 5, 1892, p. 95; 22d Rept. Ent. Soc. Ontario for 1891 (1892), pp. 52–54, figs. 10–11; Garden and Forest, vol. 5, no. 252, 1892, p. 491.—Hausen, Canad. Record Sci., vol. 5, 1892, p. 52.—Laurent, Ent. News, vol. 3, 1892, p. 37.—Marten, Prairie Farmer, vol. 64, no. 52, 1892, p. 828, fig.—Webster, Ohio Agric. Exp. Sta., Bull. 45, 1892, pp. 191–193, figs. 15–17.—Kerremans, Mem. Soc. Ent. Belg., no. 1, 1892, p. 271.—Hopkins, Insect Life, vol. 4, 1892, p. 257.—Townsend, Canad. Ent., vol. 25, 1893, p. 202.—McCarthy, N. Car. Agric. Exp. Sta., Bull. 92, pt. 2, 1893, p. 129.—Hamilton, Canad. Ent., vol. 25, 1893, pp. 274, 326.—Smith, Rept. N. J. Agric. Exp. Sta. for 1892 (1893), pp. 456–459, fig. 28; Rept. N. J. Agric. Exp. Sta. for 1893 (1894), pp. 544–545, figs. 109–110.—Webster, Ohio Farmer, vol. 85, 1894, p. 357, figs. 4–5; Insect Life, vol. 7, 1894, p. 203; Ohio Agric. Exp. Sta., Bull. 58, 1895, pp. 29–30.—Davis, Proc. Mich. Hort. Soc. for 1894 (1895), p. 82, fig.—Hamilton, Trans. Amer. Ent. Soc., vol. 22, 1895, pp. 324, 364.—Comstock, Manual of Insects, ed. 1 (1895); ed. 2 (1897), p. 550, fig. 664.—Lintner, 48th Rept. N. Y. State Mus. Nat. Hist., 1895. pp. 406–407, fig. 8.—Castle and Laurent, Ent. News, vol. 7, 1896, p. 303; vol. 8, 1897, p. 8.—Harrington, 27th Rept. Ent. Soc. Ontario for 1896 (1897), p. 71, figs. 73–74.—Lugger, Minn. Agric. Exp. Sta., Bull. 66, 1899, pp. 142–145, figs. 65–66; 5th Ann. Rept. Minn. Agric. Exp. Sta., 1899, pp. 58–61, figs. 65–66.—Smith, 27th Rept. N. J. State Board Agric. for 1899 (1900), suppl. p. 256, figs. 103–104.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—Felt, N. Y. State Mus., vol. 8, no. 37, 1900, p. 14, fig. 15; N. Y. State Mus., Bull. 53, 1902, pp. 839, 874.—Ulke, Proc. U. S. Nat. Mus., vol. 25, no. 1275, 1903, pp. 21, 47.—Young, N. Y. State Mus., Bull. 64, 1903, p. 157.—Chittenden, Yearbook U. S. Dept. Agric. for 1902 (1903), p. 731.—Young, 18th Rept. N. Y. State Ent. for 1902 (1903), p. 157.—Sherman, Bull. N. Car. State Board Agric., vol. 24, No. 6, 1903, pp. 27–28, figs. 14–15.—Pettit, Mich. Agric. Exp. Sta., Bull. 24, 1904, p. 30, figs. 27–28.—Lockhead, 34th Rept. Ent. Soc. Ontario for 1903 (1904), p. 74, fig. 36.—Washburn, Minn. Agric. Exp. Sta., Bull. 88, 1904, p. 51, fig. 31.—Gossard, Ohio Agric. Exp. Sta., Bull. 164, 1905, p. 24.—Nicholson, Okla. Agric. Exp. Sta., Bull. 69, 1905, pp. 15–16.—Slingerland, Cornell Agric.

Exp. Sta., Bull. 234, 1906, p. 75.—Jarvis, 37th Rept. Ent. Soc. Ontario for 1906 (1907), p. 66.—Bethune, 38th Rept. Ent. Soc. Ontario for 1907 (1908), p. 97, figs. 30–31.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 6 (authors ed.), 1909, p. 23; Bull. Buffalo Soc. Nat. Sci., vol. 9, 1909, p. 401.—Easton, Psyche, vol. 16, 1909, p. 50.—Blatchley, Coleoptera of Indiana, 1910, p. 798, figs. 307–308.—Smith, Rept. N. J. State Mus. for 1909 (1910), p. 294, figs. 112–113.—Hitchings, 5th Rept. State Ent. Maine for 1909 (1910), p. 4.—Gossard, Ohio Agric. Exp. Sta., Bull. 233, 1911, p. 146.—Treherne, 42d Rept. Ent. Soc. Ontario for 1911 (1912), p. 24.—Caesar, 42d Rept. Ent. Soc. Ontario for 1911 (1912), p. 31.—Sanderson, Insect Pests, 1912, pp. 466–468, figs. 335–336.—Dean and Peairs, Kans. Agric. Educ., vol. 6, no. 2, 1913, pp. 112–113, fig. 109.—Manee, Ent. News, vol. 24, 1913, p. 170.—Moore, Minn. State Ent., Circ. 29, 1914, pp. 1–4, fig.—Brooks, U. S. Dept. Agric., Journ. Agric. Research, vol. 3, no. 2, 1914, p. 184.—Slingerland and Crosby, Manual Fruit Insects, 1914, pp. 332–333, figs. 290–293.—O'Kane, Injurious Insects, 1914, p. 244, figs. 320–322.—Somes, Mo. State Fruit Exp. Sta., Bull. 25, 1915, pp. 14–15.—Grant, 45th Rept. Ent. Soc. Ontario for 1914 (1915), p. 16.—Johnson, Ent. News, vol. 26, 1915, p. 312.—Marcovitch, Minn. Insect Life, vol. 3, no. 9, 1916, p. 5.—Baldwin, 8th Rept. State Ent. Indiana, 1916, p. 158.—Nicolay, Bull. Brooklyn Ent. Soc., vol. 12, 1917, p. 93.—Caesar, 47th Rept. Ent. Soc. Ontario for 1916 (1917), p. 109.—Chagnon, 9th Rept. Quebec Soc. Protection Plants, suppl. pt. 3, 1917, p. 219.—Lowther, Gem State Rural and Idaho Farmer, vol. 24, no. 14, 1918, p. 13.—Felt, N. Y. State Mus., Bull. 200, 1918, p. 142.—Graham, Minn. State Ent., Circ. 50, 1918, p. 5, fig. 5.—Washburn, Injurious Insects, 1918, pp. 139–140, fig. 158.—Chittenden, Journ. Econ. Ent., vol. 11, 1918, p. 456.—Blackman, N. Y. State College Forestry, Tech. Bull. 10, pt. 2, 1918, p. 124.—Ruggles and Graham, Minn. Agric. Exp. Sta., Spec. Bull. 29, 1918, pp. 28–29, fig.—Nicolay, Bull. Brooklyn Ent. Soc., vol. 14, 1919, p. 19.—Britton, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 245.—Fluke, Journ. Wisc. Horticulture, vol. 10, 1920, p. 186, fig.—Frost and Weiss, Canad. Ent., vol. 52, 1920, pp. 204–205.—Jones, Wis. State Dept. Agric., Bull. 33, 1920, p. 157; 50th Rept. Wis. State Hort. Soc., 1920, p. 149.—Sanderson, Insect Pests, 2d ed., 1921, pp. 409–410, figs. 344–45.—Chittenden, U. S. Dept. Agric., Farmer Bull. 1286, 1922, pp. 1–5, figs. 1–5.—Mutchler and Weiss, N. J. Dept. Agric. Bur. Statistics and Inspection, Circ. 48, 1922, pp. 10–11, figs. 6–7.—Knull, Canad. Ent., vol. 54, 1922, p. 84.—Scholl, Texas Dept. Agric., Bull. 72, 1922, p. 80.—Hutchings, 53d Rept. Ent. Soc. Ontario, 1923, pp. 43–45, figs.—Russell and Morrison, Wisc. Agric. Exp. Sta., Bull. 352, 1923, pp. 73–74, figs. 36–37.—Mundinger, N. Y. State College Forestry, Tech. Bull. 17, pt. 14, 1924, p. 316.—Comstock, Introduction to Entomology, 1925, p. 503, fig. 601.—Chapin, U. S. Dept. Agric., Bull. 1355, 1925, p. 33.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 39.—Chamberlin, Cat. Buprestidae, 1926, pp. 80–81.

Male.—Elongate and rather slender; head and pronotum cupreous or aeneous, and feebly shining; scutellum and elytra subopaque, black, and sometimes with a feeble bluish tinge; beneath uniformly black, and more shining above.

Head with the front wide, nearly flat, slightly wider at top than bottom, the lateral margins feebly expanded from bottom to top, and with a broad, deep, longitudinal depression extending from the occiput to epistoma, the depression deepest on the vertex; surface coarsely, sparsely punctate on the front, becoming coarsely rugose on the vertex and occiput, and sparsely clothed behind the epistoma with a few short, semierect, whitish hairs; epistoma rather narrow between the antennae, a broad, deep, arcuate emargination at the middle, and with the anterior margin transversely truncate on each side of the emargination; antennae extending beyond middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, strongly elongate, and about equally rounded above and beneath.

Pronotum nearly one-half wider than long, slightly narrower at base than apex, and widest at apical third; sides freely arcuately rounded from apical angles to basal third, then obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side, the marginal and submarginal carinae are rather strongly sinuate, narrowly separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate, with the median lobe broadly rounded; base feebly emarginate at middle of each elytron, and the median lobe broadly truncate in front of scutellum; disk moderately convex, with a rather deep, transverse, concave depression on basal half, a very broad, deep depression along the lateral margin at middle, and without any trace of prehumeral carina; surface coarsely, densely, transversely rugose, and with numerous fine punctures between the rugae. Scutellum strongly, transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base, about equal in width at base and apical third, rather deeply, broadly, arcuately constricted in front of middle, and arcuately narrowed from apical third to the tips, which are separately, broadly rounded, and strongly serrulate; sides of abdomen slightly exposed above; disk slightly flattened, sutural margins strongly elevated posteriorly, with broad, deep basal depressions, and without trace of longitudinal costae; surface densely, finely granulate-punctate.

Abdomen beneath coarsely punctate, and finely granulose on the basal segment, becoming sparsely, finely punctate toward the apex, the punctures connected transversely by fine, sinuate lines, and sparsely clothed with very short, whitish hairs; first segment broadly, longitudinally concave at middle, second with a moderately broad, deep, smooth groove at the middle, the groove slightly wider anteriorly, and extending from the anterior margin to behind middle of segment; vertical portions of segments sparsely pubescent; pygidium coarsely punctate, with the median carina strongly elevated, narrow, slightly projecting, and truncate at apex. Prosternum sparsely, coarsely punctate, finely granulose, and sparsely clothed with short, recumbent, whitish hairs; prosternal lobe rather narrow, strongly declivous, and broadly rounded in front; prosternal process broad, the sides feebly narrowed to behind the coxal cavities, then more abruptly narrowed to the apex, which is acute. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle nearly rectangular. Tibiae slender, straight, the anterior and middle pairs armed with a distinct, short tooth on the inner margin at apex. Posterior tarsi distinctly shorter than the tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth acute at apex, the inner one slightly broader, turned inward and the tip sometimes touching that of the opposite side.

Female.—Differs from the male in having the front of head broader, more cupreous, and the surface more finely punctate; elytra slightly wider at apical third than at base; tibiae unarmed at apex; prosternum more sparsely punctate, the first two abdominal segments not grooved at the middle, and the surface smoother.

Length, 4–7 mm.; width, 1.25–2 mm.

Type locality.—" America." Present location of type unknown to writer.

Distribution.—This species has a wide distribution, being found in eastern Canada (Quebec, Ontario), and covering the entire eastern half of the United States. Material has been examined from various localities in the following States: Alabama, Arkansas, Connecticut, District of Columbia, Delaware, Florida, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, West Virginia, and Wisconsin.

Variations.—The species is remarkably constant except in size and color. The pronotum is usually reddish cupreous, but varies to green, aureous or aeneous, and rarely specimens are found in which this part is very dark or nearly black. The elytra are usually black, but occasionally a specimen will show a feeble bluish tinge.

Host.—Attacks all varieties of blackberry, raspberry, and dewberry (*Rubus* spp.) both wild and cultivated, causing elongate swellings or galls on the canes, and frequently doing considerable damage to cultivated varieties. It has been reported as breeding in rose, which is somewhat doubtful, and Chamberlin (1926) records it from willow (*Salix* sp.) and oak (*Quercus* sp.), but these last two hosts are probably recorded from wrongly identified specimens.

This is the best known species of *Agrilus* found in North America, and is commonly known as the "raspberry gouty gall beetle" and the "red-necked raspberry cane borer." Herbst's (1801) figure is misleading, if indeed it can be intended for this species at all. Harris (1829) placed this species in his new subgenus *Teres*.

7. AGRILUS LATERALIS (Say)

Figure 5

Buprestis lateralis Say, Journ. Acad. Nat. Sci. Phila., vol. 3, pt. 1, 1823, p. 159.

Agrilus lateralis Say, Trans. Amer. Philos. Soc., new ser., vol. 6, 1836, p. 162.—LeConte, Trans. Amer. Philos. Soc., new ser., vol. 11, 1859, p. 250; Say's Writings, vol. 2 (Baillière Bros., ed. 1859; Cassino and Co., ed. 1883), pp. 103, 596.—Thomas, 6th Rept. Ill. State Entomol., 1877, p. 114 (probably wrong identification).—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 290–291.—Smith, 27th Ann. Rept. N. J. State Board Agric. for 1899 (1900), suppl. p. 256.—Chittenden, U. S. Dept. Agric. Div. Ent., Bull. 22, new ser., 1900, p. 68.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 5, no. 3, 1902, p. 269 (probably wrong identification).—Schaeffer, Brooklyn Inst. Mus., Sci. Bull., vol. 1, no. 7, 1905, p. 150.—Fall and Cockerell, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 180 (identification?).—Blatchley, Coleoptera of Indiana, 1910, p. 798.—Smith, Ann. Rept. N. J. State Museum for 1909 (1910), p. 294.—Gibson, 43rd Ann. Rept. Ent. Soc. Ontario for 1912 (1913), p. 126 (separate, page 14).—Frost, Canad. Ent., vol. 47, 1915, p. 144.—Johnson, Ent. News, vol. 26, 1915, p. 312.—Somes, Mo. State Fruit Exp. Sta., Bull. 25, 1915, p. 14 (probably wrong identification.)—Nicolay, Bull. Brooklyn Ent. Soc., vol 14. 1919, p. 19.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 205.—Frost, Canad. Ent., vol. 52, 1920, p. 249.—Britton, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 244.—Mutchler and Weiss, N. J. Dept. Agric., Bureau of Statistics and Inspection, Circ. 48, 1922, p. 9.—Fisher, Proc. Ent. Soc. Wash., vol. 24, 1922, pp. 124–125.—Knull, Canad. Ent., vol. 54, 1922, p. 84.—Blatchley, Canad. Ent., vol. 55, 1923, p. 18.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 39.—Chamberlin, Cat. Buprestidae, 1926, p. 68 (in part).

Agrilus sayi Saunders, Cat. Buprestidarum, 1871, no. 393, p. 126 (name unnecessary as *lateralis* is not preoccupied).

Male.—Form of *ruficollis*, rather strongly shining, head, pronotum and scutellum aeneo-cupreous, and the elytra piceous; beneath aeneous, with a strong cupreous reflection.

Head with the front wide, nearly flat, slightly wider at top than at bottom, the lateral margins feebly, obliquely expanded from botton to top, and with a broad, longitudinal depression extending from the occiput to epistoma, the depression becoming obsolete near the epistoma; surface feebly, coarsely rugose, rather densely, coarsely punctate, and very sparsely clothed with short, whitish hairs; epistoma rather narrow between the antennae, and broadly, feebly, arcuately emarginate in front; antenne scarcely extending to middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes large, and about equally rounded above and beneath.

Pronotum two-fifths wider than long, base and apex about equal in width, and widest in front of middle; sides arcuately rounded from apical angles to basal third, then obliquely narrowed to the posterior angles, which are rectangular; marginal and submarginal carinae when viewed from the side are strongly sinuate, the carinae narrowly separated anteriorly, and connected to each other at the basal fourth; anterior margin feebly sinuate, with a broadly rounded median lobe; base deeply emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of the scutellum; disk moderately convex, with two round depressions arranged longitudinally at the middle, the anterior one only feebly indicated, a rather deep, oblique depression along lateral margins near middle, a small, round depression near posterior angles, and with or without distinct, short prehumeral carinae; surface coarsely, densely rugose, rather densely punctate, and sparsely clothed with short, inconspicuous, whitish pubescence, which is slightly denser and longer in the lateral depressions. Scutellum strongly, transversely carinate, and the surface feebly reticulate.

Elytra slightly wider than pronotum at base and slightly narrower at base than at apical third; sides nearly parallel behind humeri, broadly, arcuately constricted in front of middle, broadly, arcuately expanded at apical third, then obliquely attenuate to the tips, which are separately, broadly rounded, and distinctly irregularly serrulate; sides of abdomen broadly exposed above; disk slightly flattened, feebly, longitudinally depressed along suture, which is slightly elevated posteriorly, and with broad, deep basal depressions; surface finely, densely granulate-punctate, and sparsely, uniformly clothed with short, recumbent whitish hairs.

Abdomen beneath finely, rather densely punctate on the apical segments, but becoming coarsely punctate and transversely rugose on the basal segments, and sparsely clothed with short, recumbent, whitish pubescence; first segment broadly flattened at the middle, second with a deep, nearly smooth groove at the middle, the groove slightly wider anteriorly, and extending from the anterior margin to behind middle of segment; vertical portions of the segments densely clothed with long, recumbent, yellowish white pubescence; pygidium coarsely punctate, with the median carina strongly elevated, strongly projecting, and truncate at apex. Prosternum coarsely, sparsely punctate and rather densely clothed with moderately long, semierect, whitish hairs; prosternal lobe strongly declivous, and broadly rounded in front; prosternal process broad, the sides parallel to behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle nearly rectangular. Tibiae slender, anterior and middle pairs slightly arcuate, and armed with a short tooth on the inner margin at apex. Posterior tarsi distinctly shorter than the tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near middle, the outer tooth acute at apex, the inner one broader, shorter, and turned inward.

Length, 7.5 mm.; width, 2 mm.

Female.—Differs from the male in being usually larger and more robust; front of head more cupreous; antennae and posterior tarsi shorter; prosternum more finely punctate; tibiae unarmed at apex; first two abdominal segments convex, and the second without a deep depression at middle.

Redescribed from a male collected on bayberry (*Myrica carolinensis*) at Lyme, Connecticut, by the writer. Since the type of this species is lost, I am designating this specimen as the neotype, and depositing it in the United States National Museum collection.

Type locality.—"Missouri."

DISTRIBUTION

Material examined:

CONNECTICUT: Lyme, June–July (reared, Fisher, Champlain). Orange, June (Zappe, Walden). Hamden, June (Zappe). Salem, July (Foote). North Haven, July (Walden). New Haven, June (Zappe, Walden). Meriden, June 11 (Johnson).
FLORIDA: Istokpoga (Blatchley).
MASSACHUSETTS: Tynsboro (——).
NEW JERSEY: Buena Vista, June (Liebeck).
NEW YORK: Albany; Pennyquid Barrens, L. I., July 8 (——).
PENNSYLVANIA: Cedar Run, July 12; Bear Meadows, July 5; Charter Oak, July 4 (J. N. Knull).

Also recorded from the following localities:

COLORADO: Colorado Springs (H. F. Wickham) (identification?).
FLORIDA: St. Augustine, April 21 (Johnson).
ILLINOIS: Southern part (Thomas) (identification?).
MAINE: Wales, June 23 (C. A. Frost).
MISSOURI: (Say) (Somes).
NEW JERSEY: Eagle Rock (Bischoff). West Berlin, June 25 (Boerner). Browns Mills and Lacy, July (Daecke). Atco, June 3 (Liebeck). Lakehurst, June (Nicolay). South Jersey (Wenzel).
NEW MEXICO: (Ulke, Fall, and Cockerell) (identification?).
NEW YORK: Staten Island; Buffalo, June (Leng). Half-Way-Hollow Hills, July 2; Yaphank, June (Davis). Bellport, July (Nicolay). Queens, July (Frost). Massapequa, July (Shoemaker).
NOVA SCOTIA: Port Midway and Greenfield, July (Bolster).

Variations.—Size 6 to 9 millimeters in length. The coloration is rather constant in this species, although the pronotum shows a slight variation from bronzy cupreous to reddish cupreous. The median depression on the pronotum is slightly variable in depth, and in some examples of both sexes there is a vague indication of prehumeral carinæ, but these are not sufficiently distinct to be placed with the species having prehumeral carinæ.

Host.—Larvae live near the base of living bayberry (*Myrica carolinensis* Miller) and require two years to reach maturity (Fisher, 1922). This species has been recorded by Somes (1915) as living in the young twigs of apple in Missouri, but these specimens have been probably wrongly identified. Knull (1922) collected the adults in numbers on sweet fern (*Comptonia peregrina* (Linnaeus) Coulter), and since the sweet fern is closely allied to bayberry, indicates that this plant is also the host of this species. The adults have been recorded on poplar sprouts by Horn (1891) and on white and post oak by Thomas (1877), but the larvae probably do not live in these trees.

This species is closely allied to *ruficollis* Fabricius, and may be confused with that species in some collections. It can, however, be easily separated from that species, since the front of the head is only feebly depressed, the elytra piceous and uniformly clothed with short pubescence, and the underside of the body is aeneous or cupreous, whereas in *ruficollis* the head is deeply depressed in front, the elytra and body beneath black, and the elytra are without distinct pubescence.

8. AGRILUS OBTUSUS Horn

Figure 6

Agrilus obtusus HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 288.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 73.

Male.—Elongate, robust, opaque, uniformly æneous, with a more or less distinct cupreous tinge; beneath more shining than above.

Head with the front wide, feebly convex, slightly wider at top than at bottom, the lateral margins feebly, arcuately expanded at middle, and with a rather deep, broad depression extending from occiput to epistoma, the depression narrowly, longitudinally grooved on the occiput; surface densely, coarsely punctate, coarsely rugose, and sparsely clothed with long, recumbent, whitish hairs; epistoma rather narrow between the antennae, broadly, arcuately emarginate in front, and the anterior margin transversely truncate on each side of the emargination; antennae short, extending to about apical third of pronotum, serrate from the fourth joint, and the outer joints wider than long; eyes large, and equally rounded above and beneath.

Pronotum one-fourth wider than long, wider at base than apex, and widest at the base; sides slightly rounded behind apical angles, then nearly parallel to posterior angles, which are slightly expanded; when viewed from the side the marginal carina is feebly sinuate, the submarginal carina straight, the two carinae rather widely separated anteriorly, and connected to each other near the base; anterior margin feebly sinuate, with the median lobe obsoletely rounded; base transversely truncate to middle of each elytron, then broadly rounded to the scutellum, in front of which it is broadly subtruncate; disk strongly convex, with a broad, deep, concave, median depression extending from base to near the anterior margin, the depression much deeper posteriorly, a broad, deep depression on each side along lateral margin, and without distinct prehumeral carinae; surface coarsely, densely, and irregularly rugose, coarsely, densely punctate between the rugae, and sparsely clothed in the depressions with long, recumbent, yellowish pubescence. Scutellum depressed, not transversely carinate, and the surface somewhat rugose.

Elytra slightly narrower than pronotum at base, slightly wider at base than at apical third, rather deeply, broadly, arcuately constricted in front of middle, and obliquely attenuate from apical third to the tips, which are separately, broadly rounded, and obsoletely serrulate; sides of abdomen very broadly exposed above; disk slightly flattened, feebly, broadly concave along the sutural margins, and with broad, shallow basal depressions; surface finely, densely granulate-punctate, more or less rugose, and sparsely clothed with short, recumbent, whitish pubescence.

Abdomen beneath finely punctate at middle, more coarsely and densely at the sides and on first segment, the punctures connected transversely by sinuate lines, rather densely clothed with recumbent yellowish white pubescence, and the lateral margin entirely obliterated on the first two segments; first segment convex, not depressed or densely pubescent at middle; vertical portions of the segments not conspicuously pubescent; pygidium coarsely punctate, with a median carina, which is not projecting. Prosternum coarsely, densely rugose, and rather densely clothed with long, erect, white hairs at the middle; prosternal lobe wide, strongly declivous, and broadly subtruncate in front; prosternal process broad, the sides parallel to behind the coxal cavities, and obtusely rounded at apex. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle rectangular. Tibiae slender, the anterior and middle pairs feebly arcuate, and not distinctly armed with a tooth at apex. Posterior tarsi distinctly shorter than the tibiae, and the first joint as long as the following two joints united.

Tarsal claws similar on all feet, cleft near the middle, the teeth acute at tips, about equal in length, and the inner ones turned inward.

Length, 9.5 mm.; width, 2.75 mm.

Female.—Unknown.

Redescribed from the lectotype No. 3474 in the collection of the Academy of Natural Sciences, Philadelphia.

Type locality.—Texas, probably near the lower Rio Grande.

Distribution.—This species is rare in collections, as only three specimens have been seen by the writer, two from the type locality in the collection of the Academy of Natural Sciences, Philadelphia, and one in the United States National Museum, from New Braunfels, Tex., collected November 17, 1895, by H. Soltau. Chamberlin (1926) records a specimen in the Wenzel collection from Chisos, Tex., collected July 20.

Variations.—None worthy of note has been observed in the specimens examined.

Host.—Unknown.

9. AGRILUS DIFFICILIS Gory

Figure 7

Agrilus difficilis DEJEAN, Cat. Coleopt., ed. 2, 1833, p. 82; ed. 3, 1837, p. 93 (no description).—GORY, Mon. Bupr. Suppl., vol. 4, 1841, pp. 224–225, pl. 37, fig. 215.—LECONTE, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9; Trans. Amer. Philos. Soc., vol. 11, new ser., 1859; pp. 244–245.—CROTCH, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, pp. 92–93.—HUBBARD and SCHWARZ, Proc. Amer. Philos. Soc., vol. 17, 1878, p. 656.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 287–288, pl. 8, fig. 8.—KERREMANS, Mem. Soc. Ent. Belg., no. 1, 1892, p. 255.—HAMILTON, Canad. Ent., vol. 28, 1896, p. 263.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser, 1900, p. 67.—BLATCHLEY, Coleoptera of Indiana, 1910, p. 797.—FROST and WEISS, Canad. Ent. vol. 52, 1920, p. 204.—CHAMPLAIN and KNULL, Canad. Ent., vol. 57, 1925, p. 113.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 58.

Agrilus occidentalis UHLER, Proc. Acad. Nat. Sci. Phila., vol. 7, 1855, p. 416.—COOK, 29th Rept. Mich. Board Agric., 1890, p. 119.

Male.—Elongate and moderately shining; head green in front, becoming purplish or blackish green on the occiput; pronotum, scutellum, and elytra blackish green, with a distinct purplish reflection in certain lights; beneath cupreous, and more shining than above.

Head with the front wide, flat, about equal in width at top and bottom, the lateral margins arcuately expanded above the middle, with a feeble, narrow, longitudinal groove on the occiput, a shallow, transverse depression behind the epistoma, and a shallow, round depression on each side behind the middle, the margins of these two depressions strongly angulated anteriorly, forming the letter W at the middle; surface coarsely punctate, slightly rugose, finely granulose, and densely clothed with long, recumbent, yellow pubescence behind the epistoma, the pubescence becoming sparser toward the top: epistoma wide, transverse between the antennae, with a semicircular emargination in front, and the anterior margin feebly rounded on each side of the emargination: antennae extending slightly beyond middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes very large, broadly elongate, and slightly more acutely rounded above than beneath.

Pronotum one-third wider than long, slightly narrower at base than apex, and widest near middle; sides feebly, arcuately rounded, slightly more oblique posteriorly; when viewed from the side the marginal carina is feebly sinuate, the submarginal carina straight, the two carinae rather widely separated anteriorly, and connected to each other near the base: anterior margin strongly sinuate, with the median lobe broadly rounded; base deeply emarginate at middle of each elytron, the median lobe very wide, and subtruncate in front of scutellum; disk feebly convex, with a rather shallow, oblique depression on each side along lateral margin, an obsolete depression in front of scutellum, and with arcuate, obtusely rounded, prehumeral carinae, which are connected to the marginal carina near the middle; surface densely, transversely rugose, finely, sparsely punctate between the rugae, and sparsely clothed with recumbent, yellowish hairs in the lateral depressions, Scutellum strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra slightly wider than pronotum at base, slightly wider at base than just behind the middle; sides nearly parallel, feebly, broadly arcuately constricted in front of middle, and obliquely attenuate posteriorly to the tips, which are separately, broadly rounded, and strongly serrulate; sides of abdomen broadly exposed above for nearly their entire length; disk somewhat flattened, each elytron with two feeble, longitudinal costae, and a rather deep, oblong basal depression; surface coarsely punctate, the punctures shallow, irregularly distributed, becoming rather strongly imbricate toward the apex, and clothed with a few inconspicuous hairs.

Abdomen beneath finely, densely punctate, and sparsely clothed with whitish hairs on the median parts, coarsely imbricate or rugose at sides of first segment, the other segments with a densely punctured spot, densely clothed with recumbent yellowish pubescence on each side near the anterior margin, and the lateral margin sometimes obliterated on the first two segments; first segment convex, not depressed or densely pubescent at middle; vertical portions of the segments each with a densely clothed, yellow pubescent spot in front; pygidium coarsely punctate, with a sharply elevated, median carina, which is not projecting. Prosternum finely, densely granulate-punctate, and densely clothed with fine, erect, silky white pubescence; prosternal lobe broad, feebly declivous, broadly rounded in front, and with an acute emargination at the middle; prosternal process broad, the sides parallel to behind the coxal cavities, and obtusely rounded at the apex. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle somewhat acute. Tibiae slender, the anterior and middle pairs feebly arcuate, and armed with a short tooth on the inner margin at apex. Posterior tarsi as long as the tibiae, and the first joint as long as the following three joints united. Tarsal claws nearly similar on all feet, cleft at middle, the teeth acute at tips, about equal in length, and the inner one turned inward.

Female.—Differs from the male in being more robust, front of head broader, more cupreous, and the surface more coarsely punctured; prosternum sparsely, coarsely punctate, and not pubescent at middle; tibiae unarmed at apex, and the posterior tarsi shorter than the tibiae.

Length, 7–13 mm.; width, 1.4–3.5 mm.

Type locality.—Of *difficilis*, "North America"—present location of type unknown to writer; of *occidentalis*, Evansville, Indiana. Type in Museum of Comparative Zoology at Cambridge, Mass.

DISTRIBUTION

ARKANSAS: Marion County, May 29, 1897 (——).

COLORADO: Cheyenne Wells, September 12, 1927 (S. C. McCampbell).

ILLINOIS: Paxton, July 30, 1916, on honey locust (——). Decatur, June 13 (A. W. Lindsey).

INDIANA: Evansville (Uhler). Lafayette, June 23, 1917, bred from Prickly Ash (J. J. Davis). Marion and Posey Counties, June 19–July 21 (Blatchley).

IOWA: No definite locality.

KANSAS: Douglas County (——).

KENTUCKY: Louisville (Soltau).

LOUISIANA: Tallulah, July 7, 1924 (——).

MICHIGAN: Port Huron (Hubbard and Schwarz).

MISSOURI: No definite locality.

NEBRASKA: Lincoln, April 12, 1915, on honey locust (L. M. Gates).

OHIO: Cincinnati (Soltau). Columbus, July 4–31, breeding in dead honey locust (J. N. Knull). Sandusky, July 6 (——).

TENNESSEE: Elmwood (Fenyes).

TEXAS: Dallas; Tedor (Leng).

Variations.—This species is quite variable in size and color, and the upper surface varying from a greenish to a reddish cupreous tinge under certain conditions of light. In some examples the lateral margin of the second abdominal segment is nearly obliterated, whereas in others it is quite distinct. The tarsal claws are somewhat variable in both sexes, the inner tooth is usually strongly turned inward and nearly touching that of the opposite side, but occasionally the tips are rather widely separated, and this is especially true of the claws on the anterior feet, which are not quite as strongly turned inward as those on the middle and posterior feet.

Hosts.—It has been reared by J. J. Davis from Prickly Ash (*Xanthoxylum clavaherculis* Linnaeus), and Champlain and Knull (1925) records it breeding in dead Honey Locust (*Gleditsia triacanthos* Linnaeus). It has also been recorded by Uhler (1855) on Willow (*Salix* sp.), but the larvae probably do not live in these trees.

10. AGRILUS CUPRICOLLIS Gory

Figure 8

Agrilus cupricollis Dejean, Cat. Coleopt., ed. 2, 1833, p. 82; ed. 3, 1837, p. 93 (no description).—Gory, Mon. Bupr. Suppl., vol. 4, 1841, pp. 240–241, pl. 40, fig. 232.—LeConte, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 297–298.—Blatchley, Canad. Ent., vol. 51, 1919, p. 29.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 207.—Chamberlin, Cat. Buprestidae, 1926, p. 58.

Agrilus arcuatus LeConte (not Say), Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, pp. 242–243.—Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 92.—Chamberlin, Cat. Buprestidae, 1926, pp. 51–52 (part).

Male.—Form of *ruficollis*; head and pronotum shining, aureous or cupreous, the head with a small triangular black space on occiput, and pronotum with a similar black spot along anterior margin at middle; elytra black, and subopaque; beneath black, with a slight purplish tinge, and more shining than above.

Head with the front wide, feebly convex, slightly wider at top than at bottom, the lateral margins obliquely expanded from bottom to top, and with a rather narrow, very deep, longitudinal depression extending from occiput to middle of front; surface coarsely, sparsely punctate, more or less rugose, and clothed with a few short, erect, whitish hairs behind the epistoma; epistoma not transverse between the antennae, feebly, narrowly, arcuately emarginate in front, and the anterior margin transversely truncate on each side of the emargination; antennae extending to about middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, elongate, and equally rounded above and beneath.

Pronotum about three-sevenths wider than long, slightly narrower at base than apex, and widest at apical third; sides arcuately rounded from apical angles to basal third, then nearly parallel to the posterior angles, which are rectangular; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina nearly straight, the two carinae widely separated anteriorly, and connected to each other near basal third; anterior margin slightly sinuate, with the median lobe feebly, broadly rounded; base feebly emarginate at middle of each elytron, the median lobe broadly rounded, and transversely truncate in front of the scutellum; disk moderately convex, with two deep, broadly rounded depressions on the median line, one near the anterior margin, the other in front of scutellum, with a very broad, deep depression on each side, extending obliquely from the lateral margin to near the median line, and with short, obtuse elevations in place of prehumeral carinae; surface coarsely, densely, transversely rugose, and sparsely punctate between the rugae. Scutellum transversely carinate, and the surface finely, densely reticulate.

Elytra scarcely wider than pronotum at base, and equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly, feebly constricted in front of middle, broadly, feebly expanded behind middle, then arcuately narrowed to the tips, which are separately, rather broadly rounded, and finely serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, sometimes with a very vague trace of costa, sutural margins slightly elevated behind middle, and with broad, moderately deep basal depressions; surface densely finely granulose.

Abdomen beneath obsoletely granulose, finely, sparsely punctate, the punctures more or less connected transversely by sinuate lines, which are coarser on the two basal segments, and sparsely clothed with short, inconspicuous hairs; first segment vaguely flattened at middle; last segment broadly rounded at apex; vertical portions of segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, and only vaguely carinate anteriorly. Prosternum sparsely punctate, more or less granulose, and sparsely clothed with long, erect, fine hairs; prosternal lobe broad, moderately declivous, and broadly but not deeply, arcuately emarginate in front; prosternal process rather broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, anterior pair with a very short tooth on inner margin at apex, middle and posterior pairs simple. Posterior tarsi slightly shorter than tibiae, and the first joint about as long as the following three joints united. Tarsal claws similar on all feet, cleft near middle, the teeth nearly equal in length, and the inner tooth turned inward.

Female.—Differs from the male in having the first abdominal segment more convex at middle; anterior tibiae unarmed at apex, and the prosternum not clothed with long, erect hairs at middle.

Length, 5–6.25 mm.; width, 1.3–1.9 mm.

Redescribed from specimens in the United States National Museum from Capron, Florida.

Type locality—"North America." Present location of type unknown to writer.

DISTRIBUTION

FLORIDA: Dunedin, March–April; Ormond (Blatchley). Capron, April 5; Tampa, April 11–13 (Hubbard and Schwarz). Enterprise; Miami (Leng). Gainesville, May 19 (Dury). St. Augustine (Horn). Coronado, April 26 (Knaus).

Variation.—The specimens examined show no variation except in size.

Host.—Unknown. Blatchley (1919) records collecting adults on huckleberry and other low shrubs.

This species is not common in collections, and so far, has only been recorded from Florida. It has been more or less confused in the literature, as LeConte (1859) misidentified this species as *arcuatus* Say, and *cupricollis* has been considered as a synonym of *arcuatus* by many of the later writers, although it is quite distinct from the species described as *arcuatus* by Say. Horn (1891) corrected this error and placed *arcuatus* LeConte (not Say) as a synonym of *cupricollis*. This species resembles *ruficollis* Fabricius, but can be easily separated from that species by the absence of the projecting carina on the pygidium, and also by the distinctly deeper depressions on the pronotum.

11. AGRILUS CUPREOMACULATUS Dugès

Agrilus cupreomaculatus DUGÈS, La Naturaleza, vol. 2, ser. 2, 1891, p. 30, pl. 2, fig. 48.—MASON, Ent. News, vol. 37, 1926, p. 85.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 58.

Female.—Form similar to *fuscipennis*, and rather strongly shining; head yellowish bronze, more or less cupreous on the occiput, and becoming blackish in the depression; pronotum reddish cupreous, with the sides densely clothed with bright orange yellow pubescence and efflorescence, and the median depression and a round spot on each side along anterior margin bluish black; elytra black, with a distinct greenish tinge; beneath piceous, and more shining than above.

Head with the front not quite as wide as in *fuscipennis*, slightly wider at top than at bottom, the lateral margins obliquely expanded from bottom to top, with a broad, deep, triangular depression on the vertex and occiput, a deep, longitudinal, concave depression extending from it to the epistoma, and a narrow, transverse depression behind the epistoma and antennal foveae; surface coarsely, sparsely, irregularly punctate, slightly, longitudinally rugose on the occiput, and clothed with a few semierect hairs behind the epistoma; epistoma narrow between the antennae, slightly elevated, and broadly but not very deeply, arcuately emarginate in front; antennae extending nearly to middle of pronotum, serrate from the fourth joint, and the outer joints slightly wider than long; eyes large, rather broadly elongate, and equally rounded above and beneath.

Pronotum nearly one-half wider than long, wider at base than at apex, and widest at middle; sides feebly sinuate, and moderately, arcuately rounded from apical angles to base; when viewed from the side the marginal carina is feebly sinuate, the submarginal carina nearly straight to basal third where it is strongly, arcuately expanded, and the two carinae separated for their entire length; anterior margin rather strongly sinuate, and the median lobe rather strongly, broadly rounded; base feebly, broadly emarginate at middle of each elytron, with the median lobe strongly, broadly rounded, and truncate in front of scutellum; disk moderately convex, with a broad, deep, concave median depression extending from anterior margin to scutellum, a broad, deep, kidney-shaped depression on each side along lateral margin, and without prehumeral carinae; surface coarsely, densely, irregularly rugose, coarsely, sparsely punctate between the rugae, and the surface in lateral depressions concealed by the short, dense, golden yellow pubescence and efflorescence. Scutellum feebly, transversely carinate, and the surface finely, densely granulose.

Elytra about as wide as pronotum at base, and equal in width at base and behind middle; sides feebly expanded for a short distance behind base, broadly, arcuately constricted in front of middle, rather strongly, broadly expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and strongly serrulate; sides of abdomen narrowly exposed above; disk broadly, longitudinally depressed along sutural margins, which are rather strongly elevated behind middle, and with broad, deep, basal depressions; surface densely, coarsely, acutely imbricate-punctate.

Abdomen beneath obsoletely granulose, finely, densely punctate, the punctures connected transversely at sides of segments, denser and acutely imbricate on basal segment, and sparsely clothed with short, inconspicuous hairs; first segment convex at middle; last segment broadly rounded or subtruncate at apex; vertical portions of the segments not conspicuously pubescent; pygidium densely, coarsely punctate, and distinctly, longitudinally carinate, but the carina not projecting. Prosternum sparsely, coarsely punctate, coarsely, transversely rugose, and sparsely clothed with short, recumbent, whitish hairs; prosternal lobe broad, rather strongly declivous, and feebly, arcuately emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then broadly rounded to the apex. Sides of sterna densely clothed with moderately long, recumbent, reddish yellow pubescence. Tibiae more or less flattened, and unarmed at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint about as long as the following three joints united.

Tarsal claws similar on all feet, cleft near the middle, the teeth nearly equal in length, the inner ones turned inward, and their apices touching.

Length, 12 mm.; width, 3.25 mm.

Male.—Unknown.

Redescribed from a female in the United States National Museum from Tepic, Mexico.

Type locality.—Tupátaro, State of Guanajuato, Mexico. Present location of type unknown to the writer.

DISTRIBUTION

ARIZONA: Schaeffer Cañon, Baboquivari Mountains, September 18–19, 1924, at an elevation of 5,150 to 5,500 feet (Rhen and Hebard).

MEXICO: Tupátaro, State of Guanajuato; Tepic, Territory of Tepic.

Variations.—No variation worthy of note was observed in the seven specimens examined, except in size, which varies from 10 to 12 millimeters in length. The specimens from Arizona do not differ in any way from the specimen from Tepic, Mexico, and are probably all females, unless the males of this species have no distinct external sexual characters, as none of the Arizona specimens were dissected.

Host.—Unknown.

12. AGRILUS FUSCIPENNIS Gory

Figure 9

Agrilus fuscipennis DEJEAN, Cat. Coleopt., ed. 2, 1833, p. 82; ed. 3, 1837, p. 93 (no description).—GORY, Mon. Bupr. Suppl., vol. 4, 1841, pp. 238–239, pl. 39, fig. 230.—LECONTE, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9; Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 242.—CROTCH, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 92.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 289.—KERREMANS, Mem. Soc. Ent. Belg., no. 1, 1892, p. 258.—LENG, Journ. N. Y. Ent. Soc., vol. 18, 1910, pp. 76, 81; Journ. N. Y. Ent. Soc., vol. 19, 1911, p. 211; Journ. N. Y. Ent. Soc., vol. 20, 1912, p. 298.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 63.

Female.—Form large, elongate, robust, and opaque; head and pronotum cupreous, with a strong reddish purple tinge; scutellum and elytra black; beneath more shining than above, bronzy black, the anterior parts more olivaceous, and the sides of the sterna strongly purplish.

Head with the front wide, slightly wider at top than at bottom, deeply concave, the concavity extending to lateral margins and from epistoma to occiput, with a narrow, longitudinal groove in bottom of the concavity, the lateral margins obliquely expanded from bottom to top, and with a narrow, transverse depression behind the epistoma, the depression more deeply depressed behind the antennal foveae; surface coarsely, densely rugose, rather densely, coarsely punctate between the rugae, and sparsely clothed behind the epistoma with long, recumbent, yellowish hairs; epistoma not transverse between the antennae, slightly elevated, and broadly but not deeply, arcuately emarginate in front; antennae extending beyond middle of pronotum, serrate from the fourth joint, and some of the outer joints longer than wide; eyes large, elongate, and equally rounded above and beneath.

Pronotum nearly three-fourths wider than long, about equal in width at base and apex, and widest at middle; sides rather strongly arcuately rounded from apical angles to base; when viewed from the side the marginal and submarginal carinae are slightly sinuate, rather narrowly separated anteriorly, and connected to each other behind the middle; anterior margin slightly sinuate, and the median lobe only feebly indicated; base feebly, broadly emarginate at middle of each elytron, with the median lobe strongly, broadly rounded, and truncate in front of scutellum; disk irregularly convex, with a broad, deep depression on each side along lateral margin, extending nearly to the median line, which is broadly, deeply concave from anterior margin to base except at the middle, where it is strongly interrupted, and without prehumeral carinae; surface densely, deeply, transversely rugose, rather densely, coarsely punctate between the rugae, and sparsely clothed with short, semierect hairs toward the sides. Scutellum feebly, transversely carinate, and the surface finely, densely reticulate.

Elytra wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, feebly, broadly constricted in front of middle, feebly, broadly expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and finely serrate; sides of abdomen narrowly exposed above; disk slightly flattened, sutural margins slightly elevated posteriorly, and with broad, deep basal depressions; surface densely, finely, acutely granulose.

Abdomen beneath obsoletely granulose, glabrous, densely, finely punctate, the punctures coarser on the basal segment and more or less connected transversely at sides of the segments; first segment convex at middle; last segment broadly rounded at apex; vertical portions of the segments sparsely clothed with short, recumbent, yellowish hairs; pygidium sparsely, coarsely punctate, feebly carinate, but the carina not projecting. Prosternum obsoletely granulose, coarsely punctate, somewhat rugose, and sparsely clothed with short, semierect, yellowish hairs; prosternal lobe rather narrow, slightly declivous, and broadly, feebly, arcuately emarginate or subtruncate in front; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is obtusely rounded. Tibiae slightly flattened, and unarmed at apex. Posterior tarsi slightly shorter than tibiae, and the first joint about as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the teeth nearly equal in length, the inner ones turned inward, and their apices touching.

Male.—Differs from the female in being more slender, front of head slightly more pubescent, prosternum rather densely clothed with long, erect, whitish hairs, and all of the tibiae armed with a short tooth on inner margin at apex.

Length, 12–13 mm.; width, 3.25–4 mm.

Redescribed from a female in the United States National Museum, collected at Tryon, N. C., by W. F. Fiske.

Type locality.—"North America." Present location of type unknown to writer.

DISTRIBUTION

Georgia: Clayton and Ramsons Mill, in the northern part at an altitude of 2,000 feet, July, 1910 (Leng).

Kentucky: No definite locality (Dury).

Mississippi: Longview, June 7, 1916 (J. H. Oswalt). Agricultural College, May, 1919 (B. A. Donaldson), March 26 (W. J. Edens).

North Carolina: Tryon, June 11, 1903 (Fiske). Ashville, reared (R. A. St. George).

Ohio: No definite locality (Knull collection).

South Carolina: Clemson College, reared January, 1926 (F. Sherman).

Tennessee: No definite locality (Horn, Dury).

Texas: No definite locality (Horn).

Variations.—Scarcely any variation was observed in the specimens examined.

Host.—This species has been reared from Persimmon (*Diospyros virginiana* Linnaeus) by R. A. St. George, and also from the same host by students at Clemson College, S. C. Chamberlin (1926) records Sourwood (*Oxydendrum arboreum* (Linnaeus) de Candolle) as the host of this species, but this record may be based on a specimen in the United States National Museum, which was only collected on that tree, and may not be a host for the larvae.

13. AGRILUS TOWNSENDI Fall

Agrilus townsendi Fall, Trans. Amer. Ent. Soc., vol. 33, 1907, pp. 234–235.—Fall and Cockerell, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 181.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 207.—Champlain and Knull, Ent. News, vol. 34, 1923, p. 274.—Chamberlin, Cat. Buprestidae, 1926, p. 84.

Female.—Form moderately robust, strongly arcuately arched in profile, feebly flattened above, and rather strongly shining; head and pronotum aeneo-cupreous; elytra dark brown, with a distinct aeneous tinge; beneath cupreous, more or less aeneous on the legs, and more shining than above.

Head with the front rather wide, nearly flat, about equal in width at top and bottom, the lateral margins parallel to each other, and with a distinct, narrow, longitudinal groove extending from occiput to middle of front; surface coarsely, sparsely punctate, feebly rugose near epistoma and occiput, intervals smooth and shining, and sparsely clothed with short, semierect, white hairs; epistoma transverse between the antennal cavities, strongly elevated, and with a semicircular emargination in front; antennae extending nearly to middle of pronotum, serrate from the fourth joint, and the outer joints wider than long; eyes large, rather broadly oblong, and equally rounded above and beneath.

Pronotum one-half wider than long, about equal in width at base and apex, and widest in front of middle; sides slightly arcuately rounded, vaguely sinuate near posterior angles, which are nearly rectangular; when viewed from the side the marginal carina is vaguely sinuate, the submarginal carina feebly arcuate, and the two carinae rather widely separated for their entire length; anterior margin nearly transversely truncate, and without a median lobe; base strongly, broadly emarginate at middle of each elytron, the median lobe broadly rounded, and transversely truncate in front of scutellum; disk moderately convex, with a broad, vague median depression anteriorly, a deeper, transverse, concave depression along base, connected laterally to a deep, oblique depression along lateral margins, and with feebly indicated, prehumeral carinae; surface finely, densely reticulate, finely rugose, the rugae widely separated, transversely arcuate on the disk, but becoming more oblique toward the sides, sparsely punctate between the rugae, and sparsely clothed with short, recumbent, white hairs. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel or vaguely sinuate for a short distance behind the base, vaguely, broadly constricted in front of middle, vaguely, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and coarsely serrulate; sides of abdomen rather broadly exposed above; disk feebly flattened, with distinct, obtuse longitudinal costa extending from basal depression to apical third, sutural margins elevated posteriorly, and with broad, deep, basal depressions; surface finely, densely imbricate-punctate, and sparsely, uniformly clothed with short, recumbent, white hairs.

Abdomen beneath obsoletely granulose, sparsely, finely punctate, the punctures more or less connected transversely by sinuate lines, which are coarser at sides of basal segment, and sparsely, uniformly clothed with short, recumbent, white pubescence; first segment convex at middle and without a median depression; last segment broadly rounded at apex; vertical portions of segments not conspicuously pubescent; pygidium without a projecting carina. Prosternum coarsely punctate, transversely rugose, and clothed with a few short, white hairs; prosternal lobe broad, strongly declivous, and broadly, vaguely, arcuately emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a short, arcuate tooth on inner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint about as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth nearly as long as outer one, and turned inward, but the tips distant and nearly equally separated from each other and the outer tooth of the claw. Genitalia not examined.

Length, 7.75 mm.; width, 2.25 mm.

Male.—Differs from the female in having the head and pronotum slightly more reddish cupreous, front of head slightly more depressed anteriorly, the epistoma not elevated, the antennae slightly longer and the outer joints more transverse, and the tarsal claws nearly similar on all feet, cleft near the tip, the two teeth nearly equal in length, but the claws on posterior pair slightly more deeply cleft.

Redescribed from the female type in the collection of H. C. Fall.

Type locality.—Rio Ruidosa, White Mountains, N. Mex., at an altitude of 6,500 feet.

DISTRIBUTION

ARIZONA: Oak Creek Canyon, 6,000 feet, July (Snow). Prescott, June 20 (Barber and Schwarz). Chiricahua Mountains, May 30 (Hubbard and Schwarz).

NEW MEXICO: Rio Ruidosa, White Mountains, 6,500 feet (Townsend).

Variations.—No variation was observed in the four specimens examined except in size, which varies from 7.5 to 8.75 millimeters.

Host.—The type was beaten from *Quercus utahensis* (A de Candolle) Rydberg (syn. *gambelii* Nuttall) by C. H. T. Townsend.

This species has the tarsal claws toothed in a fashion nearly intermediate between those having the inner tooth turned inward and nearly touching that of the opposite side, and those in which the inner tooth is not turned inward.

14. AGRILUS ARBUTI, new species

Agrilus species BURKE, Journ. Econ. Ent., vol. 10, 1917, pp. 330–331; U. S. Dept. Agric., Bull. 437, 1917, pl. 8, figs. 3, 6; pl. 9, fig. 2 (no text).

Male.—Form resembling *angelicus*, feebly shining, and slightly flattened above; head aeneous or greenish, becoming feebly brownish on occiput; pronotum aeneous or aureous, becoming broadly reddish cupreous on the disk; elytra brownish aeneous, rarely with a feeble cupreous reflection; beneath aeneous, with a distinct cupreous tinge, and more shining than above.

Head with the front wide, feebly convex, vaguely wider at top than bottom, the lateral margins feebly expanded from bottom to top, usually with a narrow longitudinal groove extending from occiput to middle of front, and with a broad, vague depression behind the epistoma; surface finely, densely granulose, coarsely but not deeply, irregularly rugose, the rugae more or less longitudinal on occiput, sparsely, coarsely punctate between the rugae, and sparsely clothed with short, semierect hairs, which are longer behind the epistoma; epistoma strongly transverse between the antennae, strongly elevated, and with a deep, arcuate emargination in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, elongate, and vaguely more broadly rounded above than beneath.

Pronotum one-half wider than long, about equal in width at base and apex, and widest near middle; sides feebly arcuately rounded from apical angles to behind middle, then more strongly narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are feebly sinuate or nearly straight, widely separated anteriorly, and connected to each other near base; anterior margin distinctly sinuate, with a feeble, broadly rounded, median lobe; base broadly, arcuately emarginate at middle of each elytron, the median lobe feebly, broadly rounded, and subtruncate in front of scutellum; disk moderately convex, a broad, vague, anterior and posterior median depression, a broad moderately deep depression on each side along lateral margin, and with very sharply defined, short prehumeral carinae; surface densely granulose, densely, rather deeply, transversely rugose, finely, sparsely punctate between the rugae, and without distinct pubescence. Scutellum strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel or feebly sinuate for a short distance behind base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and finely serrulate; sides of abdomen narrowly exposed above; disk feebly flattened, without longitudinal costae, sutural margins slightly elevated behind middle, and with broad, deep, basal depressions; surface finely, densely imbricate-punctate, and sparsely, uniformly clothed with more or less distinct, short, whitish hairs

Abdomen beneath rather densely, finely punctate, becoming transversely rugose on basal segment, and sparsely, uniformly clothed with rather short, recumbent, whitish hairs; first and second segments convex, and without a groove at middle; last segment broadly rounded at apex; vertical portions of segments sparsely pubescent; pygidium sparsely, coarsely punctate, but not distinctly carinate. Prosternum finely, densely punctate, and rather densely clothed with long, erect, inconspicuous hairs; prosternal lobe broad, moderately declivous, and subtruncate or broadly, vaguely emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following three joints united. Tarsal claws similar, on all feet, cleft near the apex, the inner tooth shorter and distinctly broader than outer one, turned inward, but the tips distinctly separated. Genitalia similar to those of *angelicus* Horn.

Length, 7.5 mm.; width, 2.2 mm.

Female.—Differs from the male in having the upper surface reddish cupreous, and sometimes with a distinct purplish tinge on certain parts, prosternum more sparsely punctured and without long, erect hairs at middle, and the tibiae not armed with a distinct tooth at apex.

Type locality.—Ashland, Oregon.

Other localities.—Placerville, Shingle Springs, and Hullville, Calif.

Type, allotype, and paratypes.—Cat. No. 40989, U.S.N.M. Paratypes in W. J. Chamberlin's collection.

Variations.—The series examined show very little variation except in size, which varies from 5.75 to 7.5 millimeters in length, and 1.75 to 2.2 millimeters in width.

Described from a large series of both sexes collected at the above localities by H. E. Burke, F. B. Herbert, George Hofer, and L. B. Reynolds. According to H. E. Burke, this species mines the bark and wood of branches and main trunks of normal madrono or manzanita (*Arbutus menziesii* Pursh). The adults fly from May to August, and lay their eggs singly on the smooth bark of the branches and trunks, the larvae girdle and kill the branches, causing the formation of enlarged galls, and take two years to reach maturity.

This species is very closely allied to *angelicus*, and will be confused with that species in most collections. It will be rather difficult to separate these two species from cabinet specimens. but in the field their habits are quite distinct. In *arbuti* the head is not quite so strongly convex in front, with the surface more strongly rugose and coarsely punctured, and the lateral margins more parallel to each other, the anterior margin of pronotum more strongly sinuate, and the median lobe feebly, broadly rounded, the pubescence on abdomen and prosternum shorter, and the inner tooth of anterior claws distinctly broader toward the apex.

15. AGRILUS ANGELICUS Horn

Figure 10

Agrilus angelicus HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 298.—FALL, Ent. News, vol. 5, 1894, p. 98; Calif. Acad. Sci., Occasional Papers, no. 8. 1901, p. 120; Ent. News, vol. 17, 1906, p. 168.—DOANE, Journ. Econ. Ent., vol. 5, 1912, p. 347.—FROST, Canad. Ent., vol. 44, 1912, p. 246.—WOODWORTH, Guide to California Insects, 1913, p. 195.—BURKE, U. S. Dept. Agric., Bull. 437, 1917, pl. 8, fig. 4, pl. 9, fig. 1 (no text); Journ. Econ. Ent., vol. 10, 1917, p. 330.—HERBERT, Journ. Econ. Ent., vol. 12, 1919, p. 337.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 55, no. 2284, 1919, p. 535 (parasite).—ROHWER, Proc. Ent. Soc. Wash., vol. 21, 1919, pp. 4–8 (parasites).—FROST and WEISS, Canad. Ent., vol. 52, 1920, pp. 207, 247.—HERBERT, Journ. Econ. Ent., vol. 13, 1920, p. 363.—BURKE, Journ. Econ. Ent., vol. 13, 1920, pp. 379–384.—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 7.—FELT, Man. Tree and Shrub Ins., 1924, pp. 182, 186–187.—ESSIG, Ins. Western N. Amer., 1926, p. 403, figs. 278–279.—CHAMBERLIN, Cat. Buprestidae, 1926, pp. 48–49.

Agrilus politus WOODWORTH (not Say), Guide to California Insects, 1913, p. 194 (part).—CHILDS, Monthly Bull. Calif. State Comm. Hort., vol. 3, 1914, pp. 150–155, figs. 54–56.—ESSIG, Injurious and Beneficial Ins. Calif., 1915, p. 234, fig. 223 (part).—CHAMBERLIN, Ent. News, vol. 28, 1917, p. 168 (part).—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 220 (part).

Agrilus arcuatus CHAMBERLIN (not Say), Cat. Buprestidae, 1926, p. 52 (part, California records).

Female.—Form moderately elongate, rather robust, feebly flattened above, and moderately shining; head brownish cupreous; pronotum cupreous, with a feebly purplish tinge; elytra dark bronzy brown; beneath brownish cupreous, and more shining than above.

Head with the front broad, feebly convex, and wider at top than at bottom, the lateral margins obliquely expanded from bottom to top, and with a feeble, broad, longitudinal groove extending from occiput to epistoma, the groove more deeply depressed on the vertex; surface finely, sparsely punctate, irregularly rugose on the front, becoming longitudinally rugose on the occiput, and clothed with a few inconspicuous hairs behind the epistoma; epistoma strongly transverse between the antennae, feebly elevated, and with a semicircular emargination in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints slightly wider than long; eyes rather large, elongate, and slightly more acutely rounded beneath than above.

Pronotum one-half wider than long, slightly narrower at base than apex, and widest near middle; sides feebly, arcuately rounded from apical angles to behind middle, then abruptly narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are feebly sinuate, widely separated anteriorly, and connected to each other behind the middle; anterior margin feebly sinuate, and without a distinct median lobe; base strongly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, with a vague, broad median depression near anterior margin, broadly, transversely depressed on basal half, a broad, deep depression on each side along lateral margin, and with sharply defined, short, arcuate prehumeral carinae; surface obsoletely granulose, coarsely but not closely, transversely rugose, and sparsely, finely punctate between the rugae. Scutellum feebly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted in front of middle, broadly expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and feebly serrulate; sides of abdomen rather broadly exposed above; disk feebly convex, sutural margins feebly elevated posteriorly, and with broad, deep, basal depressions; surface densely, coarsely imbricate-punctate, and sparsely clothed with short, inconspicuous hairs.

Abdomen beneath obsoletely reticulate, finely, sparsely punctate, the punctures more or less connected transversely by sinuate lines, which are coarser on the basal segment, and sparsely clothed with moderately long, recumbent, whitish hairs; first segment strongly convex, and without a median depression; last segment broadly rounded at apex; vertical portions of segments not conspicuously pubescent; pygidium coarsely, sparsely punctate, but not distinctly carinate. Prosternum finely, sparsely punctate, and sparsely clothed with long, semierect, whitish hairs; prosternal lobe broad, strongly declivous, and broadly but not deeply, arcuately emarginate in front; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, straight, and unarmed at apex. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle nearly rectangular. Posterior tarsi distinctly shorter than tibiae, and the first joint nearly as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the teeth nearly equal in length, the inner tooth turned inward, but the tips distinctly separated.

Length, 6.75 mm.; width, 2.125 mm.

Male.—Differs from the female in having the front of head green, with a more or less bronzy tinge, and the surface more coarsely punctate and rugose, outer antennal joints about as long as wide, eyes equally rounded above and beneath, usually more greenish above and beneath, abdomen beneath more coarsely punctured, and the first segment slightly flattened at middle, prosternum more densely punctured, and densely clothed with long, erect, fine hairs, and the anterior and middle tibiae more or less arcuate, and armed with a short, arcuate tooth on inner margin at apex.

Redescribed from the lectotype No. 3477 in the Academy of Natural Sciences, Philadelphia. Doctor Horn had three females before him when he described this species, and from his description considered the specimen from near Los Angeles as the type, although not labeled as such by him. The other two paratypes are from the Santa Cruz Mountains, Calif., and are in the United States National Museum.

Type locality.—Near Los Angeles, Calif.

DISTRIBUTION

Material examined:

California: Santa Cruz Mountains; Los Angeles, June 8 (Van Dyke, Coquillett). Los Gatos (Burke, Hubbard, and Schwarz). San Jacinto Mountains, July 12, 1912 (——). Dunsmuir, July 20 (Dyar and Caudell). Pasadena (G. G. Smith). Palo Alto (H. E. Burke). Carmel, July 20 (Knaus coll.).

Also recorded from:

California: San Bernardino Mountains, July, 5,000 feet (H. C. Fall). Deep Creek, 6,000 feet (Dagget). Laurel, Saratoga, Confidence (H. E. Burke). Boulder Creek, San Juan, Monterey, Woodside, Niles, Alum Rock, Napa, and Mount St. Helena (R. D. Hartman). Montecito, near Santa Barbara (F. B. Herbert).

Variations.—Specimens examined vary in length from 4.75 to 6.75 millimeters, and in width from 1.25 to 2.25 millimeters. The females are rather uniform in coloration, but in the males the pronotum varies in color from dark bronzy green to a coppery red, and the elytra from a bronzy brown to a bluish black, with a feeble greenish reflection. In some examples the prosternal lobe is nearly truncate in front, the anterior median depression on pronotum is variable in size, and sometimes the basal half of the pronotum is deeply depressed in front of the scutellum.

Hosts.—Coast live oak (*Quercus agrifolia* Nee); Highland live oak (*Q. wislizenii* A. de Candolle); Leather oak (*Q. durata* Jepson): Canyon live oak (*Q. chrysolepis* Liebmann); Engelmann or mesa oak (*Q. engelmannii* Greene); California black oak (*Q. kelloggii* Newberry, syn. *californica* Torrey); and Tan oak (*Q. densiflora* (Hooker and Arnott) Rehder.).

This species causes considerable injury to oak trees used for ornamental purposes by girdling the twigs and giving the trees a ragged and unsightly appearance, and in the economic literature has been recorded as the "Pacific oak twig-girdler." So far it has been recorded only from California, and ranges from a few feet above sea level to an altitude of 6,000 feet. Childs (1914) and Essig (1915) had this species confused with *politus* Say. Burke (1920) gives a very good account of this insect and its work. All of the California locality records, and the California live and black oaks host records given under *arcuatus* Say by Chamberlin (1926), should apply to this species, as *angelicus* Horn replaces *arcuatus* Say on the Pacific coast.

16. AGRILUS MASCULINUS Horn

Figure 11

Agrilus masculinus Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 295–296.—Stromberg, Canad. Ent., vol. 26, 1894, p. 36.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—Slosson, Ent. News, vol. 13, 1902, p. 6.—Blatchley, Coleoptera of Indiana, 1910, p. 799.—Weiss, Ent. News, vol. 26, 1915, p. 101.—Johnson, Ent. News, vol. 27, 1916, p. 117.—Chagnon, 9th Rept. Quebec Soc. Protection Plants, suppl., pt. 3, 1917, p. 219.—Knull, Ent. News, vol. 31, 1920, p. 10.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 206.—Britton, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 244.—Frost, Canad. Ent., vol. 52, 1920, p. 28.—Knull, Canad. Ent., vol. 54, 1922, p. 84.—Champlain and Knull, Ent. News, vol. 34, 1923, p. 274.—Hatch, Mich. Acad. Sci. Arts and Letters, vol. 4, 1924, p. 571.—Mundinger, N. Y. State College Forestry, Tech. Pub. 17, pt. 4, 1924, p. 316.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 42, pl. 1, fig. 22.—Chamberlin, Cat. Buprestidae, 1926, p. 70.

Agrilus otiosus Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, pp. 65–66, 68 (part).—Frost and Weiss, Canad. Ent., vol. 52, 1920, pp. 205–206 (part).—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 9 (part).—Felt, 35th Rept. N. Y. State Ent. for 1921 (1923), p. 90 (part).—Chamberlin, Cat. Buprestidae, 1926, pp. 74–75 (part).

Male.—Form of *otiosus*, but slightly more robust, and moderately shining; antennae and head bronzy green; pronotum bronzy green, with a more or less brownish tinge, elytra piceous, with a strong bronzy reflection; beneath dark bronzy green, and more shining than above.

Head with the front wide, nearly flat, narrower at base than apex, the lateral margins feebly arcuately expanded from bottom to top, and with a feeble, longitudinal, median depression, which is narrower and more distinct on the occiput; surface coarsely punctate, finely granulose, somewhat irregularly rugose on the front, becoming longitudinally rugose on the occiput, and sparsely clothed on the anterior half with short, white pubescence; epistoma rather wide between the antennae, and feebly, broadly, arcuately emarginate in front; antennae extending to about posterior angles of pronotum, serrate from the fourth joint, and all the joints longer than wide; eyes very large, broadly oblong, and about equally rounded above and beneath.

Pronotum about three-sevenths wider than long, base and apex about equal in width, and widest just in front of middle; sides feebly, arcuately rounded from apex to middle, then obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal carina is feebly sinuate, and the submarginal carina nearly straight, the two carinae narrowly separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate, with the median lobe broadly rounded and strongly produced; base transversely bisinuate, the median lobe scarcely produced, and arcuately emarginate in front of scutellum; disk moderately convex, with two round, more or less distinct depressions arranged longitudinally at the middle, a rather broad depression along lateral margin extending from apical fourth to base, and with sharply defined, slightly arcuate prehumeral carinae, extending from base to near middle; surface densely, transversely rugose, finely granulose, and with numerous fine punctures between the rugae. Scutellum strongly, transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base, about equal in width at base and apical third, feebly, broadly, arcuately constricted in front of middle, and arcuately narrowed from apical third to the tips, which are separately, broadly subtruncate, and finely serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, sutural margins elevated posteriorly, with broad, moderately deep basal depressions, and with an obsolete longitudinal costa on each side; surface densely, coarsely imbricate-punctate.

Abdomen beneath coarsely punctate and finely granulose on the basal segments, becoming more finely punctate toward the apex, the punctures connected transversely by fine sinuate lines, and sparsely clothed with short, recumbent, white pubescence; first and second segments flattened or feebly concave along the median line, but not pubescent; vertical portions of the segments not conspicuously pubescent; pygidium rather densely, coarsely punctate, and indistinctly carinate at middle. Prosternum finely, densely granulose, and with a triangular space in front densely clothed with long, erect, fine, yellowish white pubescence; prosternal lobe broad, moderately declivous, and broadly, rather deeply emarginate in front; prosternal process rather wide, gradually narrowed to the apex, which is acute, and the surface sometimes with a more or less distinct longitudinal elevation. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle rectangular. Tibiae slender, the anterior pair distinctly arcuate; anterior and middle pairs armed with a distinct curved tooth on the inner margin at apex; posterior tibiae without tooth at apex. Posterior tarsi as long as the tibiae, and the first joint as long as the following joints united. Tarsal claws similar on all the feet, cleft at the middle, the outer tooth acute at apex, the inner one slightly broader, turned inward, and the tip sometimes touching that of the opposite side.

Length, 6.25 mm.; width, 1.5 mm.

Female.—Differs from the male in having the front of head cupreous, broader, lateral margins more parallel, and the surface less densely punctate; prosternum without long pubescence, the prosternal process flat; first two abdominal segments not flattened or sulcate; the tibiae unarmed at apex, and the posterior tarsi scarcely as long as the tibiae.

Redescribed from the male lectotype No. 3476 in the Academy of Natural Sciences, Philadelphia.

Type locality.—Illinois.

DISTRIBUTION

Material examined:

CANADA: Montreal Island, June (Chagnon).
CONNECTICUT: Putman (D. J. Caffrey).
DISTRICT OF COLUMBIA: Washington (Hubbard and Schwarz).
ILLINOIS: Galesburg, July (Stromberg).
INDIANA: Marion County, July 16, 1920 (——).
IOWA: Iowa City, June 3 (Buchanan).
KANSAS: Osage County, June 15 (R. H. Beamer).
MASSACHUSETTS: Mount Tom and Tynsboro (Blanchard).
MICHIGAN: Detroit, June (Hubbard and Schwarz).
MISSOURI: St. Louis, May 12, on box elder (J. T. Monell).
NEW YORK: Olcott, July 4 (Dietrich); Nassau, June 22, Pike, Newport, Buffalo, and Cranberry Lake (——).
OHIO: Columbus, Cincinnati (Dury).
PENNSYLVANIA: Harrisburg, April–June; Hummelstown, May 9–July 2; Charter Oak, June (Knull).
SOUTH CAROLINA: Clemson College, May 13 (J. O. Pepper).
SOUTH DAKOTA: No definite locality.
TEXAS: Columbus, May 6–23 (——).
VIRGINIA: Tazewell, June 9 (L. O. Jackson).
WISCONSIN: Beaver Dam, June 25 (W. E. Snyder).

Also recorded from:

NEW HAMPSHIRE: Mount Washington (Slosson).
NEW JERSEY: Newark (Weiss).

Variations.—Length, 4–6.5 millimeters; width, 0.85–1.5 millimeters. The pronotum and underside of the body are sometimes rather strongly cupreous, the sides of the pronotum occasionally are more feebly rounded anteriorly, being nearly parallel to each other, and the median depressions are more or less variable in size. The anterior margin of the prosternal lobe shows considerable variation; in some examples it is subtruncate, whereas in others it is distinctly emarginate.

Hosts.—This species has been reared by Knull (1922) from the sapwood of dead box elder or ash-leaved maple (*Acer negundo* Linnaeus) and red maple (*Acer rubrum* Linnaeus).

17. AGRILUS ALBOCOMUS, new species

Male.—Form resembling *arcuatus*, rather strongly shining, and feebly flattened above; head dark blue in front, becoming greenish on the occiput; pronotum green, with a feeble bronzy tinge on disk; elytra piceous; beneath black, with a distinct bluish or greenish tinge, and more shining than above.

Head with the front wide, feebly convex, slightly wider at top than bottom, the lateral margins feebly, obliquely expanded from bottom to top, and with a narrow, longitudinal groove extending from occiput to middle of front; surface coarsely but not deeply, irregularly rugose, sparsely, finely punctate between the rugae, and clothed with a few, very short, inconspicuous hairs; epistoma slightly transverse between the antennae, not elevated, and broadly but not deeply, arcuately emarginate in front; antennae extending nearly to base of pronotum, serrate from the fourth joint, and the outer joints slightly longer than wide; eyes moderately large, elongate, and equally rounded beneath and above.

Pronotum one-half wider than long, about equal in width at base and apex, and widest near middle; sides arcuately rounded from apical angles to base, slightly more strongly posteriorly; when viewed from the side the marginal carina is distinct and feebly sinuate, the submarginal carina straight and more or less indistinct, and the two carinae widely separated anteriorly; anterior margin feebly sinuate, and the median lobe broadly, vaguely rounded; base rather acutely emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate or feebly emarginate in front of scutellum; disk moderately convex, broadly concave along base, the concavity extending along lateral margins, but becoming narrower toward apical angles, a broad, shallow, median depression near anterior margin, and with sharply defined, straight, prehumeral carinae: surface coarsely, vaguely, irregularly rugose, finely, sparsely punctate between the rugae, and sparsely clothed with a few short, inconspicuous hairs. Scutellum feebly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel or feebly sinuate for a short distance behind base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and coarsely, densely serrulate; sides of abdomen narrowly exposed above; disk vaguely flattened, without longitudinal costae, sutural margins elevated behind middle, and with broad, shallow, basal depressions; surface rather coarsely, densely imbricate-punctate, and sparsely, uniformly clothed with short, recumbent, white hairs.

Abdomen beneath obsoletely granulose, finely, sparsely punctate except on first segment where the surface in coarsely punctate and transversely rugose, and sparsely, uniformly clothed with short, recumbent, whitish hairs; first segment feebly flattened at middle; second segment convex, and without a groove at middle; vertical portions of segments rather densely but not conspicuously pubescent; last segment broadly rounded at apex; pygidium coarsely, densely punctate, feebly, longitudinally carinate, but the carina not projecting. Prosternum finely, densely punctate, somewhat rugose, and sparsely clothed with long, erect, inconspicuous hairs; prosternal lobe broad, feebly declivous, and broadly but not deeply, arcuately emarginate in front; prosternal process broad, the sides parallel to behind coxal cavities, then arcuately narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a rather long tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near middle, the outer tooth acute at apex, the inner one broader, turned inward, and the tip touching that of the opposite side. Genitalia similar to those of *arcuatus* Say.

Length, 7.75 mm.; width, 1.9 mm.

Female.—Differs from the male in being usually more robust, front of head uniformly brownish cupreous, and more vaguely punctured; pronotum aeneous, with a vague cupreous reflection; antennae extending to middle of pronotum, and the outer joints as wide as long; prosternum more vaguely punctured, and not clothed with long, erect hairs at middle; first abdominal segment convex at middle, and the tibiae unarmed at apex.

Type locality.—Williams, Ariz.

Other localities.—Texas: Chisos Mountains, July 19; Davis Mountains, July 9, (H. A. Wenzel). New Mexico: White Mountains, July 18 (C. H. T. Townsend).

Type, allotype, and paratypes.—Cat. No. 40990, U. S. N. M. *Paratypes* also in collections of C. A. Frost, W. J. Chamberlin, and H. F. Wickham.

Described from 11 specimens (one type), 3 males and 5 females collected at the type locality on Gambel's oak (*Quercus utahensis* (A. de Candolle) Ryderberg; syn. *Q. gambelii* Nuttall) during June and July, by E. A. Schwarz and H. S. Barber; two females collected in the Chisos and Davis Mountains, Tex., on June 9 and 19, by H. A. Wenzel; and one male collected in the White Mountains, July 18, along the Rio Ruidosa, at an elevation of about 6,500 feet, on the flowers of *Rhus glabra* Linnaeus, by C. H. T. Townsend.

No variation worthy of note has been observed in the examples from Arizona, but the two paratypes from Texas differ from the type in having the pronotum slightly more cupreous, and the scutellum is sharply carinate.

This species is allied to *arcuatus* Say, but differs from that species in having the elytra sparsely, uniformly clothed with short, distinct, whitish hairs.

18. AGRILUS PARAMASCULINUS Champlain and Knull

Figure 12

Agrilus paramasculinus Champlain and Knull, Ent. News, vol. 34, 1923, p. 274.—Chamberlin, Cat. Buprestidae, 1926, p. 76.

Male.—Form of *masculinus* Horn, dark brown, with a cupreoaeneous tinge, and each elytron ornamented with an indistinct vitta of short, sparsely placed white hairs.

Head with the front rather wide, feebly convex, equal in width at top and bottom, the lateral margins nearly parallel to each other, and with a vague triangular depression behind the epistoma; surface obsoletely granulose, sparsely, coarsely punctate, slightly rugose, the rugae irregular on the front but becoming longitudinal on the occiput, and sparsely clothed on lower half with moderately long, recumbent, whitish pubescence; epistoma slightly transverse between the antennae, and very broadly, feebly emarginate or subtruncate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes large, broadly oblong, and slightly more acutely rounded beneath than above.

Pronotum one-third wider than long, base and apex about equal in width, and widest near middle; sides strongly, arcuately rounded from apical angles to behind middle, then more strongly narrowed to near the posterior angles, where they are slightly sinuate; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina nearly straight, the two carinae rather widely separated anteriorly, and connected to each other behind the middle; anterior margin slightly sinuate, with the median lobe broadly, vaguely rounded; base transversely bisinuate, the median lobe feebly produced, and arcuately emarginate in front of scutellum; disk moderately convex, with two round, shallow depressions arranged longitudinally at the middle, a rather broad, oblique depression along lateral margin extending from apical fourth to base, and with sharply defined, straight prehumeral carinae, extending from base to near middle; surface finely, densely granulose, finely but not deeply, transversely rugose, with numerous fine punctures between the rugae, and sparsely clothed toward the sides with recumbent, whitish pubescence. Scutellum strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and finely serrulate; sides of abdomen scarcely visible from above; disk slightly flattened, sutural margins strongly elevated from basal third to apex, and with broad but not very deep, basal depressions; surface finely, densely granulose, irregularly imbricate-punctate, and each elytron ornamented with a broad, indistinct vitta of sparsely placed white hairs, extending from basal depression to apex, and the apical third more or less clothed with inconspicuous white hairs.

Abdomen beneath finely granulose, sparsely, finely punctate posteriorly, becoming more densely, coarsely punctate and transversely rugose on the basal segment, and sparsely, clothed with short, recumbent, whitish pubescence; first and second segments broadly, vaguely flattened at middle; vertical portions of the segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, but not longitudinally carinate at middle. Prosternum finely, densely punctate, and rather densely clothed along middle with long, fine, erect hairs; prosternal lobe broad, moderately declivous, and broadly, feebly, arcuately emarginate in front; prosternal process rather wide, and gradually narrowed to the apex, which is acute. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle rectangular. Tibiae slender; anterior and middle pairs armed with a short tooth on inner margin at apex; posterior pair unarmed at apex. Posterior tarsi shorter than tibiae. Anterior and middle tarsal claws cleft near the middle, the outer teeth acute at apex, the inner ones turned inward and their apices touching. (Posterior claws missing.)

Length, 5.5 mm.; width, 1.5 mm.

Female.—Differs from the male in having the front of head slightly broader, more convex, and of a dark reddish brown color; antennae slightly shorter, and the outer joints slightly wider than long; prosternum more sparsely punctured, and not clothed with long, erect hairs at middle; prosternal lobe more deeply emarginate in front; prosternal process with the sides parallel to behind the coxal cavities; abdomen slightly exposed above, and all of the tibiae without a tooth at apex.

Redescribed from the male type in the Purdue University collection. (This type has been donated to the United States National Museum.)

Type locality.—Kansas.

Variations.—Among the specimens examined (type in United States National Museum, three female paratypes in the Purdue University collection, and a male and female paratype in the collection of J. N. Knull) no variation worthy of mention has been observed. All of the specimens seen of this species are from the original series labeled "Kan. T. B. A."[2]

The species is allied to *masculinus* Horn, but it can be distinguished from that species in having the color on upper surface more brownish, the first joint of the posterior tarsi shorter, a vague pubescent vitta on each elytron, and in the male the long, erect pubescence on the prosternum extends along the middle for its entire length. The pubescent vittae on elytra are only vaguely indicated, and specimens of this species are probably confused in collections under *masculinus*, but the length of the first joint of the posterior tarsi will separate both sexes from that species. The species seems to be rare in collections, and nothing is known of its habits.

Host.—Unknown.

19. AGRILUS ARCUATUS (Say)

Figure 13

Buprestis arcuata Say, Ann. Lyc. Nat. Hist. New York, vol. 1, pt. 2, 1825, p. 251.

Agrilus arcuatus Say, Trans. Amer. Philos. Soc., vol. 6, new ser., 1836, p. 162.—LeConte, Say's Writings, vol. 1, p. 387, vol. 2, p. 596 (Baillière Bros. ed., 1859; Cassino and Co. ed., 1883); Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, pp. 242–243 (erroneous identification, =*cupricollis* Gory).—Pettit, Canad. Ent., vol. 2, 1870, p. 102.—Crotch, Proc.

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[2] "T. B. A. Kan." found on many specimens in the entomological collections of this country refer to T. B. Ashton, one of the pioneer entomologists of Kansas, and after his death, in 1895, his collection was sold to Purdue University. (Knaus, Journ. Kansas Ent. Soc., vol. 1, 1928, p. 19.)

Acad. Nat. Sci. Phila., vol. 25, 1873, p. 92 (erroneous identification, =*cupricollis* GORY).—WICKHAM, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 1, no. 1, 1888, p. 87.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 296-297 (part).—HAUSEN, Canad. Record Sci., vol. 5, 1892, p. 52.—STROMBERG, Canad. Ent., vol. 26, 1894, p. 36 (part).—HAMILTON, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364.—SMITH, 27th Rept. N. J. State Board Agric. for 1899 (1900), suppl., p. 257 (=*coryli* or *fulgens*).—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67 (part).—ULKE, Proc. U. S. Nat. Mus., vol. 25, no. 1275. 1902, pp. 21, 47 (=*coryli* or *fulgens*).—FALL, Ent. News, vol. 17, 1906, p. 168.—Easton Psyche, vol. 16, 1909, p. 50.—WICKHAM, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 6, 1909 (Author's ed.), p. 23 (identification?).—BLATCHLEY, Coleoptera of Indiana, 1910, p. 799.—SMITH, Ann. Rept. N. J. State Museum for 1909 (1910), p. 295 (=*coryli* or *fulgens*).—LENG, Journ. N. Y. Ent. Soc., vol. 18, 1910, p. 76.—BEAL, U. S. Dept. Agric., Bur. Biol. Survey, Bull. 44, 1912, p. 47.—FROST, Canad. Ent., vol. 48, 1916, pp. 386–387 (=*coryli* Horn).—CHAGNON, 9th Rept. Quebec Soc. Protection Plants, suppl., pt. 3, 1917, p. 219.—RUGGLES, 17th Rept. State Ent. Minn., 1918, pp. 15–19, text figs. 1–3, pl. 1, figs. 1–4 (life history).—ROHWER, Canad. Ent., vol. 51, 1919, p. 160 (parasites).—NICOLAY, Bull. Brooklyn Ent. Soc., vol. 14, 1919, p. 19.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 206 (part).—KNULL, Ent. News, vol. 31, 1920, p. 10 (part).—BRITTON, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 244.—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, pp. 5–7, figs. 2–3 (part).—KNULL, Canad. Ent., vol. 54, 1922, p. 85 (part).—BROOKS, 15th Rept. Northern Nut Growers Assoc., 1924, p. 73 (=*torquatus* LeConte).—KNULL, Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 42–43, pl. 10, figs. 1–2 (part).—CHAMBERLIN, Cat. Buprestidae, 1926, pp. 51–52 (part).—BROOKS, Journ. Agric. Research, vol. 33, no. 4, 1926, pp. 331–338, fig. 1–3 (=*torquatus* LeConte).

Agrilus obliquus LECONTE, Trans. Amer. Ent. Soc., vol. 11, new ser., 1859, pp. 243–244.—PETTIT, Canad. Ent., vol. 2, 1870, p. 102.—CROTCH, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 92.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 297.—KWIAT, Ent. News, vol. 26, 1915, p. 237.—BRITTON, Conn. State Geol. and Nat. Hist. Survey, Bull, 31, 1920, p. 244.—CRIDDLE, 56th Rept. Ent. Soc. Ontario for 1925 (1926), p. 97.

Agrilus torquatus RUGGLES (not LeConte), 17th Rept. State Ent. Minn., 1918, pp. 15–19, text figs. 1–3, pl. 1, figs. 1–4.

Agrilus politus RUGGLES (not Say), 17th Rept. State Ent. Minn., 1918, p. 15.—WELLHOUSE, Cornell Agric. Exp. Sta., Mem. 56, 1922, p. 1106 (part).

Agrilus species WASHBURN, 24th Rept. Minn. Agric. Exp. Sta., 1917, p. 47.

Female.—Form moderately elongate, rather robust, rather strongly shining, and feebly flattened above; head and pronotum uniformly brownish cupreous; elytra black; beneath brown, with a feeble aeneous reflection, and more shining than above.

Head with the front wide, slightly wider at top, than bottom, the lateral margins feebly, obliquely expanded from bottom to top, with a broad, shallow depression on the upper half, at the bottom of which is a distinct, narrow, longitudinal groove extending from the occiput to middle of front, and with an obsolete depression on each side of the front; surface vaguely reticulate, coarsely but not deeply rugose, the rugae irregular on the front, but becoming more longitudinal on the occiput, coarsely, irregularly punctate between the rugae, and sparsely clothed with short, inconspicuous white hairs; epistoma strongly transverse between the antennae, and rather deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints slightly wider than long; eyes large, strongly elongate, and about equally rounded above and beneath.

Pronotum about two-fifths wider than long, about equal in width at base and apex, and widest at middle; sides regularly, arcuately rounded from apical angles to base; when viewed from the side the marginal carina is rather strongly sinuate, the submarginal carina nearly straight, the two carinae narrowly separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate, and the median lobe broadly rounded; base rather deeply emarginate at middle of each elytron, the median lobe broadly rounded, and arcuately emarginate in front of scutellum; disk moderately convex, broadly concave along base, the concavity extending along lateral margins to near the apical angles, a broad, shallow, median depression near anterior margin, and with sharply defined, slightly arcuate, prehumeral carinae; surface coarsely, vaguely, irregularly rugose, and finely, sparsely punctate between the rugae. Scutellum feebly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips which are separately, rather broadly rounded, and densely serrulate; sides of abdomen narrowly exposed above; disk vaguely flattened along sutural margins, which are slightly elevated posteriorly, and with broad, moderately deep, basal depressions; surface finely, densely imbricate-punctate.

Abdomen beneath densely, obsoletely granulose, rather densely, finely punctate, becoming more or less irregularly, transversely rugose on basal segments, and sparsely, uniformly clothed with short, recumbent, white pubescence; first segment convex at middle; vertical portions of the segments not conspicuously pubescent; pygidium coarsely, densely punctate, and feebly, longitudinally carinate at middle, but the carina not projecting. Prosternum finely granulose, sparsely punctate, somewhat rugose, and sparsely clothed with short semierect, white hairs; prosternal lobe broad, moderately declivous, and broadly, arcuately emarginate in front; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a very short tooth on inner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner teeth turned inward and their apices touching.

Length, 7.5 mm.; width, 2 mm.

Male.—Differs from the female in having the front of head flatter, bluish green on the front, and becoming slightly cupreous on the occiput; antenna extending beyond middle of pronotum, and the outer joints slightly longer than wide; eyes more broadly oblong; pronotum bronzy green, becoming more or less aeneo-cupreous at the middle; beneath bronzy green, with the prosternum densely, coarsely punctured, and rather densely clothed with long, erect hairs at the middle, the first abdominal segment feebly flattened at middle, and the anterior and middle tibiae armed with a long, distinct tooth on inner margin at apex.

Redescribed from a female reared from twigs of white oak (*Quercus alba* Linnaeus) at French Creek, W. Va., by F. E. Brooks. This specimen agrees very well with the female type of *obliquus* LeConte and also with Say's description of *arcuatus*. Since the type of *arcuatus* is lost, and from the description seems to be identical with the species described by LeConte as *obliquus*, it is advisable to consider the type of *obliquus* as typical of *arcuatus*. LeConte (1859) evidently did not know the species described by Say as *arcuatus*, for in describing *obliquus*, *fulgens*, and *torquatus* he compared them with a specimen from the Southern States, which he had identified as *arcuatus* but which proved to be *cupricollis* Gory.

Type locality.—Of *arcuatus*, not given—type lost. Of *obliquus*, Eagle Harbor, Lake Superior; type (*arcuatus* No. 10) in Museum of Comparative Zoölogy at Cambridge, Mass.

DISTRIBUTION

Material examined:

CONNECTICUT: Lyme, June 13–July 20 (Fisher).

DISTRICT OF COLUMBIA: Rock Creek Park, May 20, 1907 (Burden). Washington, June 23–July 4 (Hubbard and Schwarz).

ILLINOIS: Edgebrook, July 1, 1915 (——).

IOWA: McGregor, June 30, 1914 (Stoner).

KENTUCKY: Frankfort, June 9, 1889 (Soltau).

MARYLAND: Odenton, June 20–July 12; Plummer Island, July 5, August 16 (McAtee). Bladensburg, June 17, 1919 (Buchanan). Myersville, July 15, 1915 (Parker).

MASSACHUSETTS: Ashland, June, 1914 (——). Melrose (Dodge). Marion, July (——).

MICHIGAN: Eagle Harbor; Marquette (Schwarz).

MINNESOTA: St. Paul, Minneapolis, and Stillwater, reared (Ruggles).

MISSISSIPPI: Natchez, May 31, 1909 (Tucker).

MONTANA: No definite locality (Horn).

NEW JERSEY: Lakehurst, July 7 (——).

NEW YORK: Olcott, June–July, East Aurora, July 24, 1926 (Dietrich). Long Island (——).

NORTH CAROLINA: No definite locality.

OHIO: Cincinnati, June 13, 1905 (——).

PENNSYLVANIA: Montgomery County, July 28, 1918 (Wenzel). Pittsburgh (Ehrmann). Germantown, June 1; Manada Gap, July 18, Harrisburg, May 31 (Knull).

VIRGINIA: Penington Gap, July 4 (Hubbard and Schwarz). Peaks of Otter, July 26, 1906 (Palmer).

WEST VIRGINIA: Fort Pendleton, July 7 (Hubbard and Schwarz). French Creek, reared (Brooks).

Also recorded from various localities in Quebec and Ontario, Indiana, Kansas, northern Georgia, and many other localities not mentioned in the States listed above.

Variations.—Rather uniform in size and coloration, and the elytra rarely with a bluish or purplish tinge. The pronotum of the females vary slightly from a reddish cupreous to a brownish or olivaceous cupreous.

Hosts.—This species does considerable damage by girdling twigs and small limbs. It has been reared from Black Oak (*Quercus velutina* La Marck) by Ruggles and Knull; White Oak (*Quercus alba* Linnaeus) by Brooks; Beech (*Fagus americana* Sweet) by Knull and Brooks, and from Chestnut (*Castanea dentata* (Marshall) Borkhausen) by Brooks. It has been recorded from elm, but no adults have been examined by the writer from that host.

This species is considered quite variable by most writers, but in fact, it is composed of a number of phytophagic forms, which are distinguished in the field by their different habits and hosts, but the adults are very difficult to separate, especially the males, which cannot always be separated with certainty. The male genitalia of all these forms are nearly identical and the forms are not entitled to specific rank, but since their habits are different, and they seem to prefer certain host plants, it seems advisable to retain them as subspecies. In the distribution given by Chamberlin (1926), the Florida records refer to *cupricollis* Gory, and those from California to *angelicus* Horn.

The following key will assist students in separating most of the adults, especially where the host is known, or both sexes are present.

KEY TO THE SUBSPECIES

1. Sexes (with exception of the head) nearly similar in coloration ---------- 2.
   Sexes dissimilar in coloration -------------------------------------- 3.

2. Surface above nearly unicolored, aeneous with a more or less cupreous tinge. Host: Hazel____**coryli** Horn.

   Surface above bicolored; pronotum greenish, aeneous, brownish, or cupreous; elytra black. Host: Oak, beech, and chestnut____________**arcuatus** Say. (**obliquus**) LeConte.

3. Female reddish cupreous, and more or less violaceous; male pronotum aeneous, and the elytra violaceous. Host: Hazel________**fulgens** LeConte.

   Female uniformly brownish cupreous; male with pronotum reddish cupreous, the sides greenish or bluish, and the elytra black, with a violaceous tinge. Host: Hickory and pecan____________________________**torquatus** LeConte.

AGRILUS ARCUATUS subspecies FULGENS LeConte

Agrilus fulgens LeConte, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 243.—Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 92.—Harrington, Canad. Ent., vol. 16, 1884, p. 101; 15th Rept. Ent. Soc. Ontario for 1884 (1885), p. 31 (identification?).—Blanchard, Ent. Amer., vol. 5, 1889, p. 32 (erroneous identification, =*coryli* Horn).—Riley, Ins. Life, vol. 2, 1890, p. 348 (identification?, parasite).—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 297.

Agrilus arcuatus (Say) Stromberg, Canad. Ent., vol. 26, 1894, p. 36 (part).—Smith, 27th Rept. N. J. State Board Agric. for 1899 (1900) suppl. p. 257 (part).—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67 (part).—Ulke, Proc. U. S. Nat. Mus., vol. 25, no. 1275, 1902, p. 47 (part).—Smith, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295 (part).—Chamberlin, Cat. Buprestidae, 1926, pp. 51–52 (part).

Male.—Smaller, more slender, and more shining than *arcuatus;* head bluish green, becoming slightly aeneous to cupreous on the occiput; pronotum cupreous at middle, becoming aeneous toward the sides; elytra bluish black, with a distinct purplish tinge; beneath brown, with a slight aeneous tinge; antennae with the outer joints as wide as long. Genitalia similar to *arcuatus* Say.

Length, 6.5 mm.; width, 1.5 mm.

Female.—Head and pronotum bright reddish cupreous; elytra varying from cupreous to bluish black, with a more or less purplish tinge; beneath cupreous, with a distinct purplish reflection; antennae with the outer joints slightly wider than long.

Redescribed from the male type (No. 7 of the *arcuatus* series) in the Museum of Comparative Zoölogy, at Cambridge, Mass.

Type locality.—"Missouri."

DISTRIBUTION

Material examined:

Illinois: Riverside (——).
Iowa: Iowa City (H. F. Wickham)
Indiana: No definite locality.
Kansas: Douglas County, 900 feet (Snow).

MINNESOTA: No definite locality.
MISSOURI: No definite locality.
NEBRASKA: West Point, June, 1888 (——).
ONTARIO: Kearney, July 9, 1909 (Van Duzee).
Prince Edward County, July 2, 1922 (Brimley).
VIRGINIA: Fairfax County, June 16, 1923 (Nicolay).
WEST VIRGINIA: French Creek, reared (Brooks). Terra Alta, June 29, 1918 (Rohwer).

Variations.—Rather uniform in size, but the females varying considerable in color as noted above in the description. The prehumeral carinae are quite variable and in some examples the scutellum is feebly carinate, whereas in others the carina is entirely absent.

Host.—This subspecies kills the twigs of Hazel (*Corylus americana* Walter) from which F. E. Brooks has reared the adults. This form is of considerable economic importance to those who are interested in the growing of hazelnuts.

I have considered specimen number 7 of the *arcuatus* series in the LeConte collection as the type, although number 6 of this series has the LeConte label on it. This specimen is without a locality label, but the figures are in German, and the specimen agrees very well with the description, which was made from a single example received from Mr. Schuster, from Missouri. Specimen number 6 is labeled "Illinois" and is the specimen noted by LeConte in his original description as probably a variety of *fulgens*. The LeConte species label has a number of pin holes in it, which shows that it has been removed from the pin a number of times, and it is just possible that it has been replaced on the wrong specimen.

AGRILUS ARCUATUS subspecies TORQUATUS LeConte

Agrilus torquatus LECONTE, Trans. Amer. Philos. Soc., vol. 11, 1859, p. 243.—CROTCH, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 92.—HUBBARD and SCHWARZ, Proc. Amer. Philos. Soc., vol. 17, 1878, pp. 636, 656.—BLANCHARD, Ent. Amer., vol. 5, 1889, p. 32.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 296–297.—RUGGLES, 17th Rept. State Ent. Minn., pp. 15–19, text figs. 1–3, pl. 1, figs. 1–4 (erroneous identification = *arcuatus* (*obliquus* LeConte.) Say).—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 207.

Agrilus arcuatus (Say) FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 206 (part).—KNULL, Ent. News, vol. 31, 1920, p. 10 (part); Canad. Ent., vol. 54, 1922, p. 85 (part).—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, pp. 5–7 (part).—BROOKS, 15th Rept. Northern Nut Growers Assoc., 1924, p. 73.—KNULL, Ohio State Univ. Studies, vol. 2, no. 2, pp. 42–43 (part).—BROOKS, Journ. Agric. Research, vol. 33, no. 4, 1926, pp. 331–338, figs. 1–3 (life history).—CHAMBERLIN, Cat. Buprestidae, 1926, pp. 51–52 (part).

Male.—Form of *arcuatus;* head bluish green, becoming reddish cupreous on the occiput, and the surface densely, coarsely punctate and rugose; pronotum dark reddish cupreous, with a feeble purplish tinge on the median part, becoming broadly aeneous toward the sides, and the surface coarsely, deeply, transversely rugose; elytra black, with a feeble bluish or violacous reflection in certain lights; beneath bronzy green. except the abdomen, which is cupreous and strongly shining; antennae with the outer joints distinctly longer than wide. Genitalia similar to those of *arcuatus* Say.

Length, 7.5 mm.; width, 1.75 mm.

Female.—Above and beneath uniformly brownish cupreous, and sometimes with a feebly aeneous tinge; antennae with the outer joints about as long as wide.

Redescribed from the male type (No. 1 of the *arcuatus* series) in the Museum of Comparative Zoölogy, Cambridge, Mass.

Type locality.—" Kentucky."

DISTRIBUTION

Material examined:

CONNECTICUT: New Haven, July 31, 1911 (Champlain). Storrs (Brooks).
ILLINOIS: Galesburg (Stromberg). Urbana, June 14, 1910 (Vestal). Edgebrook, June 20–27 (Liljeblad). Rock Island, July 4, 1912 (——).
INDIANA: Hessville, June 18, 1911 (——).
KENTUCKY: No definite locality.
MARYLAND: Glen Echo, July 8, 1923 (Malloch).
MASSACHUSETTS: Melrose (Dodge). Ashland, June, 1892 (———).
MISSISSIPPI: Agricultural College, July 1, 1913, on pecan (Hester).
NEW YORK: Poughkeepsie, June 22, 1903 (——). New York City, July 4, 1882 (Soltau).
PENNSYLVANIA: Hummelstown, reared (Knull).
RHODE ISLAND: Providence, July 5, 1920 (Nylen).
VIRGINIA: Petersburg, Pulaski, Richmond, and Round Hill, reared (Brooks).
WEST VIRGINIA: Morgantown, Pickens, Buckhannon, Moorefield, Great Cacapon, Clarkesburg, and French Creek, reared (Brooks).
Also recorded from Michigan: Detroit and Marquette (Hubbard and Schwarz).

Variations.—Rather uniform in size and coloration. The prehumeral carinae vary somewhat in distinctness, and the scutellum is strongly carinate in some examples, whereas in others the carina is entirely absent.

Hosts.—This subspecies does considerable damage to hickory and pecan trees in nurseries and nut-tree orchards in the eastern part of the country, by pruning off small branches and terminals. It has been reared from various species of Hickory (*Hicoria* sp.) by Knull and Brooks.

Horn (1891) has confused the varieties of *arcuatus*, as the variety listed by him as *obliquus* LeConte is *torquatus* LeConte, and the one listed as *torquatus* is *obliquus*, which is a synonym of *arcuatus* Say.

AGRILUS ARCUATUS subspecies CORYLI Horn *

Agrilus arcuatus var. *coryli* HORN, Trans. Amer. Ent. Soc., vol. 18, 1891. p. 297.—HAMILTON, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull 22, new ser., 1900, p. 67.—FELT, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 723.—BLATCHLEY, Coleoptera of Indiana, 1910, p. 799.—JOHNSON, Ent. News, vol. 27, 1916, p. 117.—FROST, Canad. Ent., vol. 48, 1916, pp. 386–387.—GIBSON, 48th Rept. Ent. Soc. Ontario for 1917 (1918), p. 112 (erroneous identification, =*pseudocoryli*).—NICOLAY, Bull. Brooklyn Ent. Soc., vol. 14. 1919, p. 19.—FROST, Canad. Ent., vol. 52, 1920, p. 28.—FROST and WEISS, Canad. Ent., vol. 52, 1920, pp. 206–207.—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 18.—KNULL Canad. Ent., vol. 54, 1922, p. 85 (erroneous identification, =*pseudocoryli*).—CHAMPLAIN and KNULL, Canad. Ent., vol. 57, 1925, p. 113 (=*pseudocoryli*).—KNULL, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 43.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 52.

Agrilus arcuatus (Say) STROMBERG, Canad. Ent., vol. 26, 1894, p. 36 (part).—SMITH, 27th Rept. N. J. State Board Agric. for 1899 (1900), suppl. p. 257 (part).—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67, (part).—ULKE, Proc. U. S. Nat. Mus., vol. 25, no. 1275, 1902, p. 47 (part).—SMITH, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295 (part).—FROST, Canad. Ent., vol. 48, 1916, pp. 386–387.

Agrilus fulgens BLANCHARD (not Horn), Ent. Amer., vol. 5, 1889, p. 32.

Male.—Smaller, more slender, and more shining than *arcuatus;* head bluish green, becoming slightly aeneous to cupreous on the occiput; pronotum and elytra uniformly aeneous, with a more or less cupreous tinge; beneath brownish aeneous, with a more greenish tinge on the legs; antennae with the outer joints as wide as long. Genitalia similar to those of *arcuatus* Say.

Length, 6 mm.; width, 1.5 mm.

Female.—Head cupreous, with a feeble aureous reflection; pronotum and elytra slightly more reddish cupreous than in male; beneath cupreous, with a distinct purplish tinge; antennae with the outer joints slightly wider than long.

Redescribed from the male lectotype No. 3497, in the Academy of Natural Sciences at Philadelphia.

Type locality.—Dracut, Mass.

DISTRIBUTION

Material examined:

CONNECTICUT: Lyme, June 16, 1918 (Walden); June 1–July 2 (Fisher).
ILLINOIS: Galesburg, June 27, 1893 (Stromberg), La Grange, July 6. 1915.
IOWA: Elma, July 24, 1902 (——).
MARYLAND: Oakland, July 11 (Hubbard and Schwarz).
MASSACHUSETTS: Sherborn, June–July; Southboro, June 9, 1912 (Frost). Tynsboro (Blanchard). Springfield, July, 1916 (Chapin).
NEW YORK: Karney, July 23, 1902 (——).
PENNSYLVANIA: Charter Oak, July 5; Hunters Run, July 9 (Knull).

**Agrilus coryli* was used by Ratzeburg (Forst-Insecten, pt. 1, 1839, p. 62), so I am proposing *corylicola* new name for *coryli* Horn (not Ratzeburg).

Also recorded from:

Connecticut: Meriden.
Florida (probably an error).
Indiana.
Long Island: Wyandanch.
Maine: Paris.
Missouri.
New Jersey.

Variations.—Rather uniform in size and coloration, although some examples are slightly more purplish above, the prehumeral carinae are somewhat variable in distinctness, and in some examples the scutellum is feebly carinate, whereas in others the carina is entirely absent.

Hosts.—Adults have been collected on hazel (*Corylus americana* Walter and *C. rostrata* Aiton) and they probably girdle the twigs and small limbs of these plants similar to that of the other forms of this species, although it has not been reared from this host. It has been recorded as making galls on hazel, but these records are from erroneously identified examples, as these galls are made by the larvae of *Agrilus politus* subspecies *pseudocoryli* Fisher.

This subspecies can be separated from *arcuatus* by their smaller size, and uniform aeneous or cupreous color in both sexes. They resemble very closely the small forms of *politus* but can be separated from that species by the form of the claws.

20. AGRILUS CRINICORNIS Horn

Figure 14

Agrilus crinicornis Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 294.—Blatchley, Coleoptera of Indiana, 1910, p. 798.—Kwiat, Ent. News, vol. 26, 1915, p. 237.—Frost, Canad. Ent., vol. 47, 1915, p. 144.—Weiss, Ent. News, vol. 26, 1915, p. 101.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 206.—Frost, Canad. Ent., vol. 52, 1920, p. 28.—Knull, Canad. Ent., vol. 54, 1922, p. 84.—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 15.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 42, pl. 1, fig. 10.—Chamberlin, Cat. Buprestidae, 1926, p. 58.

Male.—Form slender, more or less linear, and moderately shining; head greenish blue, becoming aeneous on the occiput; pronotum bronzy brown at middle, becoming bronzy green toward the sides; elytra black, with a feeble bronzy or greenish reflection; beneath black, with a feeble bronzy tinge, and becoming more greenish on the legs.

Head with the front wide, nearly flat, equal in width at top and bottom, the lateral margins nearly parallel to each other, and with an obsolete longitudinal, median depression; surface densely, finely granulose, with a few coarse punctures intermixed, becoming feebly, longitudinally rugose on the occiput, and rather densely clothed on lower half with long, silvery white pubescence, which does not conceal the surface; epistoma not transverse between the antennae, and broadly but not deeply, arcuately emarginate in front; antennae extending beyond the posterior angles of pronotum, serrate from the fourth joint, all joints distinctly longer than wide, and clothed on the under side with long, sparsely placed, white hairs; eyes large, elongate, and slightly more acutely rounded beneath than above.

Pronotum about one-third wider than long, base and apex about equal in width, and widest along apical half; sides nearly parallel from apical angles to middle, then obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal carina is feebly sinuate, the submarginal carina straight, the two carinae rather widely separated anteriorly, and connected to each other near the base; anterior margin rather strongly sinuate, and the median lobe broadly rounded; base transversely bisinuate, the median lobe feebly produced, and arcuately emarginate in front of scutellum; disk moderately convex, with two broad, deep depressions arranged longitudinally at the middle, a rather deep, broad depression along lateral margin extending from apical fourth to base, and with indistinct prehumeral carinae; surface densely, finely granulose, transversely rugose on disk, and with a few fine punctures between the rugae and toward the sides. Scutellum strongly, transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and apical third; sides feebly, broadly constricted in front of middle, arcuately expanded near apical third, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and finely serrulate; sides of abdomen scarcely exposed above; disk slightly flattened, sutural margins elevated posteriorly, with broad, moderately deep basal depressions, but without distinct longitudinal costae; surface densely, coarsely imbricate-punctate.

Abdomen beneath sparsely, finely punctate, and feebly granulose on the basal segments, becoming vaguely punctate toward the apex, the punctures connected transversely by fine, sinuate lines, and sparsely clothed with short, inconspicuous hairs; first and second segments more or less flattened, but not grooved or pubescent at middle; vertical portions of segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, but not longitudinally carinate. Prosternum finely, densely granulose, with a few large punctures intermixed, and sparsely clothed with inconspicuous hairs: prosternal lobe rather broad, strongly declivous, and vaguely emarginate in front; prosternal process rather narrow, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Posterior coxae with the posterior margin deeply, broadly, arcuately emarginate, and the exterior angle rectangular. Tibiae slender, straight, and all three pairs armed with a long tooth on inner margin at apex. Posterior tarsi not quite as long as tibiae, and the first joint as long as the following joints united. Tarsal claws similar on all feet, cleft at middle, the outer tooth acute at apex, the inner one slightly broader, turned inward, and the tip sometimes touching that of the opposite side.

Length, 4.25 mm.; width, 1.125 mm.

Female.—Differs from the male in having the front of head brownish cupreous or aeneous, slightly more convex, and the surface less densely pubescent anteriorly; antennae extending slightly beyond middle of pronotum, without long hairs beneath, and the outer joints not longer than wide; pronotum more uniformly bronzy brown; beneath usually more bronzy brown, the first and second abdominal segments convex at middle, and all of the tibiae unarmed at the apex.

Redescribed from the male lectotype No. 3475 in the Academy of Natural Sciences, Philadelphia, and of the female, from a specimen taken together with a male by J. C. Bridwell.

Type locality.—Mount Tom, Tyngsboro, Mass.

DISTRIBUTION

Material examined:

Illinois: Willow Springs, July 1; Riverside, June 6, (E. Liljeblad). La Grange (——).

Maine: South Paris (C. A. Frost).

Maryland: Plummer Island, May–June (R. C. Shannon). Jackson Island, May 22, at light (Barber and Shannon).

Massachusetts: Tyngsboro (Blanchard). Framingham (Frost).

New York: Olcott, July 4 (H. Dietrich). Albany, May–June (——).

Ohio: Cincinnati, May 29 (Dury).

Pennsylvania: Inglenook, June 2; Charter Oak, June 21; Hummelstown, May-June (Knull). Jeannette (H. G. Klages). Duncannon, June 24 (J. G. Sanders).

Virginia: Chain Bridge, June 5 (J. C. Bridwell). Dead Run, May 18 (R. C. Shannon).

West Virginia: Harpers Ferry, June 19 (Hubbard and Schwarz).

Also recorded from:

Indiana: (Chamberlain), but Blatchley (1910) states it has never been reported from this State.

New Jersey: Newark (H. B. Weiss).

Variations.—Rather uniform in size, but the color is quite variable. The head varies from a brillant dark blue to a bronzy or greenish blue, and the middle of the pronotum bronzy brown to nearly black, with the sides varying from blue to bronzy green. Sometimes the pronotum is widest at the middle, and the sides are arcuately rounded. The two median depressions are slightly variable in depth, and some examples have a very short, distinct, prehumeral carina on each side. The elytra sometimes have the longitudinal costae vaguely indicated, and the prosternal lobe has the front margin subtruncate to broadly, feebly emarginate.

Host.—This species has never been reported as being reared, so the host is unknown. Frost (1915, 1920) records collecting adults on the leaves of red raspberry and oak.

The males of this species are easily separated from those of the other North American species of this genus by the antennae, which are longer than the pronotum and clothed on the under side with long hairs. Horn (1891) writes that the females have the antennae similarly pilose, but I have failed to find these long hairs on the antennae of any of the females associated with the males; even the females in the LeConte and Horn collections under *crinicornis* (if they are the females of this species) have the antennae shorter than the pronotum, and without long hairs on the under side. I am unable to satisfactorily separate the females of this species from those of *otiosus* and allied species.

21. AGRILUS DEFECTUS LeConte

Figure 15

Agrilus defectus LeConte, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 244.—Crotch, Proc. Acad. Nat. Sci., Phila., vol. 25, 1873, p. 92.—Hubbard and Schwarz,, Proc. Amer. Philos. Soc., vol. 17, 1878, p. 656.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 293–294.—Nicolay, Bull. Brooklyn Ent. Soc., vol. 14, 1919, p. 19.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 206.—Knull, Ent. News, vol. 31, 1920, p. 10.—Frost, Canad. Ent., vol. 52, 1920, p. 28.—Britton, Conn. Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 244.—Knull, Canad. Ent., vol. 54, 1922, p. 84.—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Insp., Circ. 48, 1922, p. 8.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 41, pl. 1, fig. 19.—Chamberlin, Cat. Buprestidae, 1926, p. 58.

Agrilus otiosus Blanchard, Ent. Amer., vol. 5, 1889, p. 32 (probably this species).—Hamilton, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364 (part).—Smith, 27th Rept. N. J. State Board Agric. for 1899 (1900), suppl., p. 257 (part).—Ulke, Proc. U. S. Nat. Mus., vol. 25, no. 1275, 1902, p. 47 (part).—Felt, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 518 (part).—Smith, Rept. N. J. State Mus. for 1909 (1910), p. 295 (part).—Blatchley, Coleoptera of Indiana, 1910, pp. 798–799 (part).—Frost, Canad. Ent., vol. 44, 1912, p. 252 (part).—Chagnon, 9th Rept. Quebec Soc. Protection Plants, suppl., pt. 3, 1917, p. 219 (part).—Frost and Weiss, Canad. Ent., vol. 52, 1920, pp. 205–206 (part).—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 9 (part).—Felt, 35th Rept. N. Y. State Ent. for 1921 (1923), p. 90 (part).—Chamberlin, Cat. Buprestidae, 1926, pp. 74–75 (part).

Agrilus species *b* Hopkins, W. Va. Agric. Exp. Sta., Bull. 32, 1893, p. 184.

Female.—Form slender, more or less linear like in *otiosus*, and rather strongly shining; head reddish cupreous, and slightly aeneous toward the sides; pronotum brown, with a distinct cupreous tinge; elytra brownish black, with a feeble aeneous reflection; beneath black, with a slight aeneous or greenish reflection in certain lights, and more shining than above.

Head with the front wide, feebly convex, nearly equal in width at top and bottom, and the lateral margins vaguely, arcuately expanded at middle, and with a vague longitudinal groove on vertex and occiput; surface finely, densely granulose, sparsely, coarsely punctate, finely, transversely rugose behind epistoma, and clothed with a few indistinct hairs; epistoma slightly transverse between the antennae, and broadly, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes large, elongate, and slightly more acutely rounded beneath than above.

Pronotum about one-third wider than long, base and apex about equal in width, and widest along apical half; sides nearly parallel or feebly sinuate from apical angles to middle, then obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are nearly straight, rather broadly separated anteriorly, and connected to each other at base; anterior margin rather strongly sinuate, with the median lobe broadly rounded and rather strongly produced; base transversely bisinuate, the median lobe feebly produced, and arcuately emarginate in front of scutellum; disk moderately convex, with two broad, shallow depressions arranged longitudinally at the middle, a moderately deep, broad depression along lateral margin extending from apical fourth to base, and with obsolete prehumeral carinae. Scutellum strongly, transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and apical third; sides broadly, arcuately constricted in front of middle, broadly, arcuately expanded at apical third, then obliquely narrowed to the tips, which are separately, very broadly rounded or subtruncate, and coarsely, irregularly serrate; sides of abdomen narrowly exposed above; disk feebly convex, sutural margins elevated posteriorly, with broad, shallow, basal depressions, and with only a vague trace of longitudinal costae; surface rather coarsely imbricate-punctate anteriorly, becoming smoother toward the apex.

Abdomen beneath finely, densely granulose, coarsely punctate on basal segments, becoming finely, sparsely punctate toward the apex, the punctures connected transversely by fine sinuate lines on the basal segments, and sparsely clothed with short, inconspicuous hairs; first and second segments convex at middle, and without a median depression; last segment broadly rounded or subtruncate at apex, and with a fringe of long hairs; vertical portions of the segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, with a vague longitudinal carina, but the carina not projecting. Prosternum finely granulose, sparsely punctate, and sparsely clothed with short, inconspicuous hairs; prosternal lobe broad, strongly declivous, and broadly rounded or subtruncate in front; prosternal process rather narrow, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle rectangular. Tibiae slender, straight, and without a distinct tooth at apex. Posterior tarsi about as long as the tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft at middle, the outer tooth acute at apex, the inner one slightly broader, turned inward, and the tip sometimes touching that of the opposite side.

Length, 4.75 mm.; width, 1.125 mm.

Male.—Differs from the female in having the front of head bronzy green to greenish blue, not so strongly convex, surface more distinctly granulose, and rather densely clothed on lower half with long, white pubescence, which does not conceal the surface; first two abdominal segments feebly flattened at middle, but not pubescent; last abdominal segment truncate at apex, and clothed with a dense marginal fringe of long, reddish brown hairs, which are curved and directed downward, and all tibiae with a distinct tooth on inner margin at apex.

Redescribed from the female type (No. 1) in the Museum of Comparative Zoology, Cambridge, Mass.

Type locality.—Pennsylvania.

DISTRIBUTION

Material examined:

CONNECTICUT: North Branford, June 23 (B. H. Walden). Cornwall; Southboro (Frost). New Haven, June 20 (A. B. Champlain). Lyme, June–July (Fisher).

ILLINOIS: Galesburg (Stromberg). Riverside, June 8; Beverly Hills (Liljeblad). La Grange; Edgebrook, June 18 (——).

IOWA: Iowa City, June 3; Lake Okoboji, June 21 (L. Buchanan).

MASSACHUSETTS: Framingham, May–June; Shelborn, June 8 (Frost). Dartmouth, June 15 (N. S. Easton).

MICHIGAN: Agricultural College, May 26 (L. G. Gentner). Detroit (Hubbard and Schwarz).

MISSOURI: Jefferson Barracks, May 16; Cliff Cave, April 28, 1878 (T. Pergande).

New Jersey: Clementon, May 21; South Orange, June 10 (——). Lakehurst, June 16 (L. B. Woodruff).

New York: Wading River, Long Island, June 23 (A. Nicolay).

Pennsylvania: New Bloomfield, May 23; Pond Bank, May 25; Hummelstown, May–June (J. N. Knull).

Texas: Dallas, April 26 (Schwarz and Pratt).

Recorded also from:

Kansas: No definite locality (LeConte, 1859).

New Jersey: Malago, May; Upper Montclair, July (Nicolay).

New York: Massapequa, May–June (Shoemaker). Pine Lawn (Olsen). Wyandanch, July 4 (Schott).

Variations.—Length 3.5 to 5 millimeters. The front of the head in the males vary in color from a bronzy green to a greenish blue, the median part of the pronotum from bronzy green to bluish black, and becoming more greenish blue toward the sides. The pronotum is sometimes widest at the middle, with the sides feebly arcuately rounded, the median depressions more or less variable in depth, and in a few examples are only feebly indicated.

Host.—This species has been reared by Knull (1920) from dead branches of white oak (*Quercus alba* Linnaeus).

This species is confused in collections with *otiosus*, but there should be no difficulty in separating the males from that species. The males of *defectus* have the last abdominal segment truncate at apex and clothed with a dense marginal fringe of long hairs, which are curved downward, but in the females these hairs are less conspicuous and sometimes nearly obsolete. Horn (1891, p. 294) states that "It is evident that LeConte had before him a male of this species which he mistook for the male of *lacustris*, but I failed to find the specimen at present associated with that species, and discovered that it had been removed and placed with the present species either by himself, or later by Crotch." There seems to be some error about this statement as there are only two specimens in the LeConte collection under this species and both of which are females. Chamberlin (1926) has erroneously placed this species as a synonym of *otiosus* Say, and a number of his host and distribution records refer to *defectus*.

22. AGRILUS GEMINATUS (Say)

Figure 16

Buprestis viridis Melsheimer (not Linnaeus), Cat. Ins. Penna., 1806, p. 46, no. 1016 (name preoccupied).

Buprestis geminata Say, Journ. Acad. Nat. Sci. Phila., vol. 3, pt. 1, 1823, p. 163.—LeConte, Say's Writings, vol. 2, p. 105 (Baillière Bros. ed., 1859; Cassino and Co. ed., 1883).

Agrilus geminatus SAY, Trans. Amer. Philos. Soc., vol. 6, new ser., 1836, p. 162.—STURM, Catal. Käfer Sammlung, 1843, p. 63.—LECONTE, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 250; Say's Writings, vol. 2, pp. 595–596 (Baillière Bros. ed., 1859; Cassino and Co. ed., 1883).—CROTCH, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 92.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 287, 334.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 61 (part).

Agrilus assimilis STURM, Catal. Käfer Sammlung, 1843, p. 63 (no description).

Male.—Form resembling *otiosus* Say, and moderately shining; antennae greenish black; head greenish blue, becoming slightly aeneous on the occiput; pronotum aeneo-olivaceous at middle, becoming more greenish toward the sides; elytra piceous, with a feeble aeneous tinge; beneath dark bronzy green, and more shining than above.

Head with the front wide, nearly flat, equal in width at top and bottom, the lateral margins feebly, arcuately expanded near middle, and with an obsolete, longitudinal groove extending from occiput to middle of front; surface densely granulose, rather densely, coarsely punctate, becoming longitudinally rugose on the occiput, and sparsely clothed on lower half with long, white hairs; epistoma transverse between the antennae, and broadly, but not deeply, arcuately emarginate in front; antennae extending slightly beyond middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes large, broadly oblong, and about equally rounded above and beneath.

Pronotum one-third wider than long, base and apex about equal in width, and widest along apical half; sides nearly parallel from apical angles to middle, then arcuately narrowed to the posterior angles, which are nearly rectangular; when viewed from the side the marginal and submarginal carinae are feebly sinuate, rather broadly separated anteriorly, and connected to each other near the posterior angles; anterior margin strongly sinuate, with the median lobe strongly, broadly rounded; base strongly, transversely bisinuate, with the median lobe feebly produced, and arcuately emarginate in front of scutellum; disk moderately convex, with two round, moderately deep depressions arranged longitudinally at middle, a broad, oblique depression along lateral margins, and with short, obsolete, prehumeral carinae; surface finely, densely granulose, feebly, transversely rugose, and with numerous coarse punctures between the rugae. Scutellum strongly, transversely carinate, and the surface obsoletely reticulate.

Elytra slightly wider than pronotum at base; and about equal in width at base and just behind middle; sides parallel for a short distance behind base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather narrowly rounded, and strongly serrulate; sides of abdomen scarcely exposed above; disk slightly flattened, sutural margins strongly elevated posteriorly, with broad, moderately deep, basal depressions, and with an obsolete longitudinal costa on each side; surface densely, strongly, imbricate-punctate.

Abdomen beneath obsoletely reticulate, sparsely, finely punctate, becoming more or less transversely rugose on basal segment, and sparsely clothed with short, recumbent, whitish hairs; first and second segments feebly flattened at middle, and clothed with a longitudinal series of long, whitish hairs; vertical portions of the segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, and without a distinct median carina. Prosternum densely, finely punctate, and densely clothed at middle with a longitudinal series of long, fine, erect hairs; prosternal lobe rather broad, moderately declivous, and broadly rounded in front; prosternal process rather narrow, the sides nearly parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle rectangular. Tibiae slender, straight, and armed with a short tooth on the inner margin at apex. Posterior tarsi as long as the tibiae, and the first joint nearly as long as the following joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth acute at apex, the inner one slightly broader, turned inward, and the tip sometimes touching that of the opposite side.

Length, 3.75 mm.; width, 0.85 mm.

Female.—Differs from the male in having the pronotum and front of head aeno-cupreous, the latter slightly more convex, and not densely clothed with long pubescence behind the epistoma; prosternum more sparsely punctured, not densely pubescent at middle, and the prosternal lobe subtruncate or feebly emarginate in front; first two abdominal segments convex at middle, and not clothed with long hairs, and the tibiae unarmed at apex.

Redescribed from a male and female from central Missouri in the United States National Museum collection. Since the type of this species has been lost, I am designating the male from which the above description was made as the neotype.

Type locality.—Missouri.

DISTRIBUTION

Material examined:

ILLINOIS: La Grange (——).

MASSACHUSETTS: Framingham, June 11; North Attleboro, June 21 (C. A. Frost).

MICHIGAN: Detroit, June (Hubbard and Schwarz). Agricultural College, June 6 (L. G. Gentner).

Missouri: Central part, July (C. V. Riley). Jefferson Barracks, May 16 (——). St. Louis, May 24 (W. V. Warner).
New Hampshire: Hampton, May 28 (S. A. Shaw).
New Jersey: Clementon, May 30 (——).
Oklahoma: Sulphur, May 1 (W. J. Brown).
Pennsylvania: No definite locality.
Texas: Colorado County, April 7 (Grace Riley). Dallas, April (Schwarz and Pratt).
Virginia: Chain Bridge, June 5 (J. C. Bridwell).

Also recorded from:

Indiana:
Wisconsin:

Variations.—This species is more or less variable in coloration. In the males the front of the head varies from a brilliant blue to bluish green, the pronotum sometimes more uniformly olivaceous, and the elytra with a feeble violaceous reflection. The sides of the pronotum are strongly sinuate anteriorly in some examples, whereas in others the pronotum is widest at the middle, and the sides are arcuately rounded. The median depressions on the pronotum are also quite variable in depth, and in some examples are only feebly indicated. The prehumeral carinae are obsolete in some specimens, whereas in others they are distinctly indicated. Length. 3.75 to 5 millimeters.

Host.—Unknown.

This species was first listed and erroneously identified as *viridis* Linnaeus by Melsheimer (1806) in his list of Pennsylvania Insects, and Say (1823) described the female from Missouri. Crotch (1873) stated that it was the female of *otiosus* Say. As it is impossible to recognize the females of *otiosus* and allied species, I am using this name for a species which is common in the central part of Missouri (type locality of *geminatus*) instead of describing it under a new name.

It is very closely allied to *otiosus*, but in *geminatus* the male genitalia have the sides nearly parallel to each other and broadly transparent toward the apex, whereas in *otiosus* the sides of the genitalia are arcuately expanded and not transparent. The females can not be satisfactorily separated from those of the allied species.

23. AGRILUS OTIOSUS Say

Figure 17

Agrilus virescens Dejean, Cat. Coleopt., ed. 2, 1833, p. 82; ed. 3, 1837, p. 93 (no description).

Agrilus otiosus Say, Trans. Amer. Philos. Soc., vol. 6, new ser., 1836, pp. 163–164.—Sturm, Catal. Käfer Sammlung, 1843, p. 63.—LeConte, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 244; Say's Writings, vol. 2, pp. 597–598 (Ballière Bros. ed., 1859; Cassino and Co. ed., 1883).—Pettit, Canad. Ent., vol. 2, 1870, p. 102.—Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 92.—Henshaw, Psyche, vol. 1, 1874, p. 17.—Provancher, Petite Fauna Ent. Canada, vol. 1, Les Coleopteres, 1877, p. 359.—Zesch and Reinecke, North Amer. Ent. (Buffalo, N. Y.), vol. 1, 1880, p. vii.—Harrington, 14th Rept. Ent. Soc. Ontario for 1883 (1884), p. 45; Canad. Ent., vol. 16, 1884, p. 102; 15th Rept. Ent. Soc. Ontario for 1884 (1885), p. 31.—Blanchard, Ent. Amer., vol. 5, 1889, p. 32 (probably *frosti*).—Packard, 5th Rept. U. S. Ent. Comm., 1890, p. 367 (probably *egenus*).—Cook, 29th Rept. Mich. Board Agric., 1890, p. 119.—Townsend, Psyche, vol. 5, 1890, p. 233.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 291–293, pl. 8, fig. 18 (part).—Hausen, Canad. Ent., vol. 5, 1892, p. 52.—Lewis, Journ. Linn. Soc. London, Zoology, vol. 24, 1893, p. 328.—Hopkins, W. Va. Agric. Exp. Sta., Bull. 32, 1893, p. 183 (part).—Townsend, Canad. Ent., vol. 25, 1893, p. 202.—Stromberg, Canad. Ent., vol. 26, 1894, p. 36 (part).—Hamilton, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364 (part).—Wickham, Proc. Davenport Acad. Nat. Sci., vol. 6 (Author's ed.), 1896, p. 152.—Wolcott, Ent. News, vol. 7, 1896, p. 236.—Slosson, Ent. News, vol. 8, 1897, p. 238.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, pp. 65–66, 68 (part).—Smith, 27th Rept. N. J. State Board Agric. for 1899 (1900), suppl. p. 257 (part).—Ulke, Proc. U. S. Nat. Mus., vol. 25, no. 1275, 1902, p. 47 (part).—Young, 18th Rept. N. Y. State Ent. for 1902 (1903), p. 157.—Felt, N. Y. State Mus., Mem. 8, vol 2, 1906, pp. 502, 518, 729 (part).—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 6, no. 2 (Author's ed.), 1909, p. 23.—Easton, Psyche, vol. 16, 1909, p. 50.—Smith, Rept. N. J. State Mus. for 1909 (1910), p. 295 (part).—Leng, Journ. N. Y. Ent. Soc., vol. 18, 1910, p. 76.—Blatchley, Coleoptera of Indiana, 1910, pp. 798–799 (part).—Frost, Canad. Ent., vol. 44, 1912, p. 252 (probably *defectus* or *frosti*).—Johnson, Ent. News, vol. 26, 1915, p. 312.—Felt, N. Y. State Mus., Bull. 186, 1916, p. 95 (this is *champlaini*); Bull. 180, 1916, p. 117 (this is *cephalicus*).—Chagnon, 9th Rept. Quebec Soc. Protection Plants, suppl. pt. 1, 1917, p. 219 (part).—Nicolay, Bull. Brooklyn Ent. Soc., vol. 14, 1919, p. 20.—Frost and Weiss, Canad. Ent., vol. 52, 1920, pp. 205–206 (part).—Frost, Canad. Ent., vol. 52, 1920, p. 28.—Britton, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 245.—Knull, Ent. News, vol. 31, 1920, p. 8; Canad. Ent., vol. 54, 1922, p. 85.—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 9 (part).—Felt, 35th Rept N. Y. State Ent. for 1921 (1923), p. 90 (part).—Blackman and Stage, N. Y. State College Forestry, Tech. Pub. 17, pt. 1, 1924, pp. 23, 24, 66–67 (part).—Fall, Bull. Brooklyn Ent. Soc., vol. 20, 1925, p. 181.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 40, pl. 1, figs. 6, 21.—Chamberlin, Cat. Buprestidae, 1926, pp. 74–75 (part).

Agrilus virens Gory, Mon. Bupr. Suppl. vol. 4, 1841, p. 259, pl. 43, fig. 252.—LeConte, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9; Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 250.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 334.

Agrilus egenus Harrington (not Gory), Canad. Ent., vol. 15, 1883, p. 80; 14th Rept. Ent. Soc. Ontario for 1883 (1884), pp. 36, 45; Canad. Ent., vol. 16, 1884, p. 102; 15th Rept. Ent. Soc. Ontario for 1884 (1885), p. 31 (probably *otiosus*).—Cook, 29th Rept. Mich. Board Agric., 1890, p. 119 (probably *otiosus*).—Packard, 5th Rept. U. S. Ent. Comm., 1890, pp. 291. 372 (part).—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67 (part).—FELT, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 729 (part).—DAECKE, Ent. News, vol. 20, 1909, p. 330 (probably *otiosus*).—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 223 (part).—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 8 (part).

Male.—Form slender, more or less linear, and moderately shining; antennae and head greenish blue; pronotum dark bronzy green, with the sides more bluish; elytra piceous, with a strong greenish or bronzy tinge; beneath dark bronzy green, and more shining than above.

Head with the front wide, nearly flat, slightly wider at bottom than at top, the lateral margins nearly parallel to each other, and without any distinct depressions; surface rather densely, coarsely punctate toward the top, densely, finely granulose, becoming longitudinally rugose on the occiput, and densely clothed on the lower half with long, silvery white pubescence, which conceals the surface; epistoma strongly transverse between the antennae, and broadly but not deeply, arcuately emarginate in front; antennae extending nearly to posterior angles of pronotum, serrate from the fourth joint, and all joints longer than wide; eyes large, strongly oblong, and slightly more broadly rounded above than beneath.

Pronotum about one-fifth wider than long, base and apex about equal in width, and widest along apical half; sides nearly parallel from apical angles to just behind the middle, then obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are feebly sinuate, narrowly separated anteriorly, and connected to each other near the posterior angles; anterior margin strongly sinuate, with the median lobe broadly, strongly rounded; base transversely bisinuate, with the median lobe scarcely produced, and arcuately emarginate in front of scutellum; disk moderately convex, with two round, feeble depressions arranged longitudinally at the middle, a rather broad, oblique depression along the lateral margins near middle, and with distinct, short, straight prehumeral carinae; surface coarsely, transversely rugose, and with numerous fine punctures between the rugae. Scutellum strongly, transversely carinate, and the surface obsoletely reticulate.

Elytra slightly wider than pronotum at base, slightly wider at base than behind the middle, broadly, feebly constricted in front of middle, and arcuately narrowed posteriorly to the tips, which are separately broadly rounded, and strongly serrulate; sides of abdomen scarcely exposed above; disk slightly flattened, sutural margins strongly elevated posteriorly, with broad, moderately deep basal depressions, and with an obsolete longitudinal costa on each side; surface densely imbricate-punctate.

Abdomen beneath finely, rather densely punctate, becoming somewhat rugose on the basal segments, and sparsely clothed with moderately long, recumbent, whitish pubescence; first and second segments feebly flattened at middle, and clothed with a longitudinal series of densely placed, long, whitish hairs; vertical portions of the segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, with the median carina feebly elevated, but not projecting. Prosternum densely, finely punctate, and densely clothed with a longitudinal series of long, fine, erect hairs at the middle; prosternal lobe rather wide, slightly declivous, broadly rounded, and subtruncate or feebly emarginate in front; prosternal process rather narrow, the sides nearly parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle nearly rectangular. Tibiae slender, straight, and armed with a short tooth on inner margin at apex. Posterior tarsi about as long as the tibiae, and the first joint as long as the following joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth acute at apex, the inner one slightly broader, turned inward, and the tip sometimes touching that of the opposite side.

Length, 5.25 mm.; width, 1.25 mm.

Female.—Differs from the male in being more robust, front of head aeneous, slightly more convex, and not densely clothed with long, white pubescence behind the epistoma; marginal carinae of pronotum more strongly sinuate; prehumeral carinae not quite so sharply elevated; prosternum more sparsely punctate and not clothed with long, erect hairs; first two abdominal segments not depressed or clothed with long pubescence at middle; tibiae unarmed at apex, and the posterior tarsi usually shorter than tibiae.

Redescribed from a male and female in the United States National Museum collection, which were reared from hickory twigs collected at Kanawha Station, West Virginia, by Dr. A. D. Hopkins. Since the type of this species has been lost, I am designating the male from which the above description was made as the neotype.

Type locality.—Indiana.

DISTRIBUTION

Material examined:

CONNECTICUT: Wallingford, June 17 (D. J. Caffrey). Hamden, May–June (Britton, Champlain, Walden). Westville, June (B. H. Walden). Portland, August 13 (Walden). New Haven, July (M. P. Zappe). Lyme, reared (Fisher, Champlain). Greenwich, May; Cornwall, June 15 (Chamberlin).

DISTRICT OF COLUMBIA: Washington, May (——).

ILLINOIS: Galesburg (Stromberg coll.).

INDIANA: No definite locality.

IOWA: Lake Okoboji, July 24 (L. Buchanan).

KANSAS: Leavenworth County, June 24 (E. P. Breakey).

MASSACHUSETTS: Melrose, June 10 (C. C. Sperry). Framingham, June (C. A. Frost).

MICHIGAN: Saline, May 28 (——). Detroit, June (Hubbard and Schwarz).

MINNESOTA: No definite locality.

MISSISSIPPI: Agricultural College, May 9 (F. M. Hull).

NEW JERSEY: Da Costa, June 4 (——).

NEW YORK: Peconic, May 29; West Nyack Junction; Wyandanch, July 4 (F. M. Schott). Staten Island (M. L. Linell).

NORTH CAROLINA: Tryon, reared (W. F. Fiske).

PENNSYLVANIA: Hummelstown, reared (J. N. Knull). Shiremanstown (A. B. Champlain). Highspire, Harrisburg, and Linglestown (W. S. Fisher).

VIRGINIA: Falls Church and Great Falls, May (Fisher).

WEST VIRGINIA: Kanawha Station, May 13 (A. D. Hopkins).

Also recorded in the literature from Canada. and various localities not mentioned in the above list, but many of these records refer to the allied species.

Variations.—This species is quite variable in coloration. In the males the front of the head varies from a deep blue to a greenish blue, the middle of the pronotum bronzy green to bronzy brown, with the sides greenish, bronzy, or bluish, and sometimes the elytra has a violaceous tinge. The median depressions on the pronotum are more or less variable, sometimes they are rather deeply depressed, and again the depressions are scarcely indicated. The prehumeral carinae are also variable in length, but always distinctly elevated. The hind tarsi vary somewhat in length, and the anterior margin of the prosternal lobe is subtruncate or more or less emarginate in front. Length 4 to 5.75 millimeters.

Host.—This species has been reared a number of times by different workers from hickory (*Hicoria* species), which seems to be its common host plant.

This species is badly confused in nearly all collections, and the citations to it in the literature usually refer also to a number of the allied species, and great care should be used in citing any of the older records of this species.

Say says in the original description that the front of head is but slightly punctured except on the vertex. In fact, the lower half is rather densely, finely punctured, but the surface is concealed by the long, white pubescence, and if this were denuded, the surface would be almost impunctate under a low power lense. Specimens were examined from near the type locality, and were identical with the one used as a neotype, but it seemed advisable to use the examples from West Virginia, since both sexes were reared, and the female is known to be of that species.

The males of this species can be separated from those of the allied species by the following combination of characters: All of the tibiae armed with a distinct tooth at apex, antennae not longer than pronotum, last abdominal segment not fimbrate at apex, the prosternum conspicuously pubescent, front of head densely clothed with long white hairs behind the epistoma, and the genitalia with the sides arcuately expanded and not transparent at apex. The females can not be satisfactorily separated from those of the allied species.

24. AGRILUS ATRICORNIS, new species

Figure 18

Male.—Form resembling *otiosus* Say, and rather strongly shining; antennae bluish black; head dark blue, with a feebly greenish tinge, and becoming slightly aeneous on the occiput; pronotum dark brown, becoming slightly aeneous toward the sides; elytra uniformly brownish black; beneath piceous, with a feeble aeneous reflection.

Head with the front wide, vaguely convex, equal in width at top and bottom, the lateral margins nearly parallel to each other, and with a vague, longitudinal groove extending from occiput to middle of front; surface densely granulose, coarsely, sparsely punctate, becoming transversely rugose behind the epistoma, and sparsely clothed on lower half with long, white hairs; epistoma transverse between the antennae, and broadly, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes large, broadly oblong, and about equally rounded above and beneath.

Protoum one-fourth wider than long, base and apex about equal in width, and widest along apical half; sides nearly parallel from apical angles to middle, then obliquely narrowed to the posterior angles, which are nearly rectangular; when viewed from the side the marginal carina is rather strongly sinuate, the submarginal carina nearly straight, the two carinae rather widely separated anteriorly, and connected to each other near the posterior angles; anterior margin strongly sinuate, with the median lobe strongly, broadly rounded; base strongly, transversely bisinuate, the median lobe feebly produced, and subtruncate in front of scutellum; disk moderately convex, with two round, shallow depressions arranged longitudinally at the middle, a broad, deep, oblique depression along lateral margins, and with short, feebly elevated prehumeral carinae; surface densely, finely granulose, feebly but not closely, transversely rugose, and with numerous rather coarse punctures between the rugae. Scutellum strongly, tranversely carinate, and the surface obsoletely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and just behind the middle; sides parallel for a short distance behind base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather narrowly rounded, and feebly serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, sutural margins strongly elevated behind the middle, with broad, moderately deep basal depressions, and with an obsolete longitudinal costa on each side; surface densely, coarsely imbricate-punctate.

Abdomen beneath obsoletely reticulate, sparsely, finely punctate, becoming transversely rugose on basal segments, and sparsely clothed with short, recumbent, whitish hairs; first and second segments vaguely, longitudinally flattened at the middle, and the first segment clothed with a longitudinal series of longer hairs at middle; vertical portions of segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, and with a vague longitudinal carina, which is not projecting. Prosternum finely, sparsely punctate, somewhat granulose, and clothed at the middle with a longitudinal series of long, fine, erect hairs; prosternal lobe rather broad, strongly declivous, and broadly but not very deeply, arcuately emarginate in front; prosternal process rather narrow, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Posterior coxae with the posterior margin broadly, arcuately emarginate, with the exterior angle nearly rectangular. Tibiae slender, straight, and armed with a distinct tooth on inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint about as long as the following joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth acute at apex, the inner one slightly broader, turned inward, and the tip sometimes touching that of the opposite side.

Length, 4 mm.; width, 1 mm.

Female.—Differs from the male in having the front of head uniformly aeneous, with a brownish cupreous tinge, broader, rather strongly convex, the surface more coarsely punctured, and the pubescence shorter; eyes more broadly rounded above than beneath; prosternum more sparsely punctate, and not clothed with long, erect hairs at middle; first two abdominal segments convex at middle and without long pubescence, and the tibae unarmed at apex.

Type locality.—Lyme, Conn.

Other localities.—Massachusetts, Sherborn; Illinois, La Grange and Galesburg.

Type, allotype, and paratypes.—Cat. No. 40991, U. S. N. M.

Paratypes.—Collections of C. A. Frost, and the Illinois Natural History Survey.

Described from 17 specimens, 7 males and 10 females. Type (male), allotype, and three paratypes collected on hazel (*Corylus* *americanus* Walter) at Lyme, Conn., June 16, 1918, by W. S. Fisher; three male and six female paratypes collected on the same host at Sherborn, Mass., June 12, 1915, by C. A. Frost; two male paratypes collected July 9, 1915, at La Grange, Ill.; and one male paratype collected at Galesburg, Ill., from the Stromberg collection.

This species is rather uniform in coloration, although the color of the head and pronotum of the females varies from bronzy green to bronzy cupreous. The sides of the pronotum show considerable variation; in some examples they are arcuately rounded, whereas in others the sides are strongly sinuate anteriorly, the depressions at middle of pronotum vary in depth, and the prehumeral carinae are more sharply elevated in some examples. The tarsi are more or less variable in length, and the prosternal lobe is subtruncate to arcuately emarginate in front. Length, 4 to 5 millimeters.

25. AGRILUS TRANSIMPRESSUS Fall

Figure 19

Agrilus transimpressus Fall, Bull. Brooklyn Ent. Soc., vol. 20, 1925, pp. 181–182.—Chamberlin, Cat. Buprestidae, 1926, p. 84.

Agrilus otiosus Hopkins, W. Va. Agric. Exp. Sta., Bull. 32, 1893, p. 183 (part).—Stromberg, Canad. Ent., vol. 26, 1894, p. 36 (part).—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68 (part).—Frost and Weiss, Canad. Ent., vol. 52, 1920, pp. 205–206 (part).—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 9 (part).—Felt, 35th Rept. N. Y. State Ent. for 1921 (1923), p. 90 (part).—Chamberlin, Cat. Buprestidae, 1926, pp. 74–75 (part).

Male.—Form resembling that of *otiosus*, rather strongly shining, and feebly flattened above; head dark bronzy green; pronotum bronzy brown at middle, becoming greenish toward the sides; elytra black, with a feeble greenish reflection; beneath black, with a greenish or aeneous tinge.

Head with the front wide, feebly convex, vaguely wider at bottom than top, the lateral margins vaguely, arcuately expanded near middle, and without a longitudinal groove or depressions; surface densely granulose, rather coarsely, densely punctate, becoming longitudinally rugose on the occiput, and the surface anteriorly nearly concealed by long, recumbent, silvery white pubescence; epistoma scarcely transverse between the antennae, not elevated, and the anterior margin with a shallow, arcuate emargination at the middle; antennae extending beyond middle of pronotum, serrate from the fourth joint, and the outer joints slightly longer than wide; eyes broadly elongate, and about equally rounded beneath and above.

Pronotum nearly one-third wider than long, about equal in width at base and apex, and widest at middle; sides arcuately rounded from apical angles to behind middle, then more strongly obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are nearly straight, narrowly separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base nearly transversely truncate, except for a broad, feeble emargination at middle of each elytron; disk moderately convex, with two broad, vague, median depressions, one in front of scutellum, the other at apical third, a broad, shallow depression on each side along lateral margin, and with rather short, feebly indicated, obtuse, prehumeral carinae; surface densely, finely granulose, closely, vaguely, transversely rugose, finely, sparsely punctate between the rugae, and without distinct pubescence. Scutellum rather strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, very broadly, feebly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and finely serrulate; sides of abdomen scarcely exposed above; disk vaguely flattened, without longitudinal costae, sutural margins rather strongly elevated posteriorly, and with broad, shallow basal depressions; surface densely and rather coarsely imbricate-punctate, and without distinct pubescent.

Abdomen beneath obsoletely granulose, sparsely, finely punctate, more or less rugose on basal segment, and sparsely clothed with moderately long, recumbent, fine hairs; first segment broadly, longitudinally depressed; second segment broadly, transversely concave when viewed from the side; last segment rather broadly rounded at apex; vertical portions of segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, but not longitudinally carinate. Prosternum finely, densely granulose, and sparsely clothed with moderately long, recumbent, white hairs; prosternal lobe broad, moderately declivous, and broadly, vaguely emarginate in front; prosternal process narrow, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, and all three pairs armed with a long, slender tooth on inner margin at apex. Posterior tarsi nearly as long as the tibiae, and the first joint as long as the following joints united. Tarsal claws similar on all feet, cleft near middle, the outer tooth acute at apex, the inner one broader, turned inward, and the tip touching that of the opposite side.

Length, 5 mm.; width, 1 mm.

Female.—Differs from the male in having front of head more convex, slightly wider at top than bottom, uniformly aeneous, and the surface more sparsely punctured and less pubescent; antennae shorter, and the outer joints slightly wider than long; surface above piceous, the pronotum becoming aeneous toward the sides; beneath black, with a more or less aeneous tinge; tibiae unarmed at apex; first and second abdominal segments convex at middle, and the last segment more acutely rounded at apex.

Redescribed from the male type in the collection of H. C. Fall.

Type locality.—Hope, Ark.

DISTRIBUTION

Material examined:

Arkansas: Hope, April 14 (Louise Knobel).
Indiana: Evansville, June 27 (H. Soltau).
Maryland: Plummer Island, reared (A. D. Hopkins); June 8 (A. Wetmore); May 25 (H. S. Barber).
Mississippi: Agricultural College, May 24 (F. M. Hull).
New Jersey: Clementon, May 30 (——).
North Carolina: Tryon, reared (W. F. Fiske).
Ohio: Cincinnati (C. Dury).
Virginia: Great Falls, May 19 (W. L. McAtee). Tazewell, June 9 (L. O. Jackson). Chain Bridge, June 5 (J. C. Bridwell).
West Virginia: Kanawha Station, reared (A. D. Hopkins).

Variations.—Length 4.5 to 6 millimeters. The front of the head in the male varies from bright blue to bronzy green. Sometimes the sides of the pronotum are parallel to each other along the anterior half, and the median depressions are moderately deep in some examples, whereas in others the depressions are scarcely indicated. The anterior margin of the prosternal lobe is broadly truncate or feebly emarginate, and sometimes the outer joints of the antennae are as wide as long.

Host.—This species has been reared from black walnut (*Juglans nigra* Linnaeus) by A. D. Hopkins and W. F. Fiske, and the adults are usually found feeding on the foliage of these trees.

The males of this species are easily separated from those of the allied species of this genus, in having the second abdominal segment transversely concave, causing the posterior part of the abdomen to be more or less bent downward, but the females can not be separated from the allied species.

26. AGRILUS FROSTI Knull

Figure 20

Agrilus frosti Knull, Ent. News, vol. 31, 1920, pp. 8–9.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 206.—Nicolay, Journ. N. Y. Ent. Soc., vol. 29, 1921, p. 175.—Knull, Canad. Ent., vol. 54, 1922, p. 84.—Fall, Bull. Brooklyn Ent. Soc., vol. 20, 1925, p. 182.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 41, pl. 1, fig. 3.—Chamberlin, Cat. Buprestidae, 1926, p. 63.

Agrilus otiosus BLANCHARD, Ent. Amer., vol. 5, 1889, p. 32 (?).—HAMILTON, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364 (part).—SMITH, 27th Rept. N. J. State Board Agric. for 1899 (1900), suppl., p. 257 (part).—ULKE, U. S. Nat. Mus., vol. 25, no. 1275, 1902, p. 47 (part).—FELT, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 518 (part).—SMITH, Rept. N. J. State Mus. for 1909 (1910), p. 295 (part).—BLATCHLEY, Coleoptera of Indiana, 1910, pp. 798–799 (part).—FROST, Canad. Ent., vol. 44, 1912, p. 252 (part).—CHAGNON, 9th Rept. Quebec Soc. Protection Plants, suppl. pt. 3, 1917, p. 219 (part).—FROST, and WEISS, Canad. Ent., vol. 52, 1920, pp. 205–206 (part).—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 9, (part).—FELT, 35th Rept. N. Y. State Ent. for 1921 (1923), p. 90 (part).—CHAMBERLIN, Cat. Buprestidae, 1926, pp. 74–75 (part).

Male.—Form of *otiosus* Say, and moderately shining; antennae and head green, the latter becoming aeneo-cupreous on the occiput; pronotum bronzy brown on the median part, becoming bronzy green toward the sides; elytra black, with a vague purplish reflection; beneath uniformly dark bronzy green, and more shining than above.

Head with the front wide, slightly convex, about equal in width at top and bottom, the lateral margins feebly, arcuately expanded at vertex, and without a median depression; surface finely, densely granulose, coarsely, rather densely punctate, slightly rugose behind the epistoma, feebly, longitudinally rugose on occiput, and sparsely clothed on lower half with long, semierect, whitish pubescence; epistoma transverse between the antennae, and feebly, broadly emarginate in front; antennae extending slightly beyond middle of pronotum, serrate from the fourth joint, and the outer joints slightly longer than wide; eyes large, rather broadly oblong, and about equally rounded above and beneath.

Pronotum nearly one-half wider than long, slightly narrower at base than apex, and widest near the middle; sides nearly parallel or feebly sinuate from apical angles to middle, then obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal carina is more or less sinuate, the submarginal carina nearly straight, the two carinae rather widely separated anteriorly, and connected to each other at base; anterior margin strongly sinuate, with the median lobe broadly rounded; base transversely bisinuate, the median lobe feebly produced, and arcuately emarginate in front of scutellum; disk moderately convex, with two round, more or less distinct depressions arranged longitudinally at the middle, a broad, deep depression along lateral margin, extending from near the apex to base, and with feebly indicated prehumeral carinae; surface coarsely, densely, transversely rugose, finely, densely granulose, and with numerous fine punctures between the rugae. Scutellum strongly, transversely carinate, with the surface densely reticulate.

Elytra slightly wider than pronotum at base, about equal in width at base and apical third, broadly, arcuately constricted in front of middle, and arcuately narrowed from apical third to the tips, which are separately, broadly rounded, and feebly, irregularly serrulate; sides of abdomen slightly exposed above; disk feebly convex, vaguely, longitudinally depressed, sutural margins elevated posteriorly, and with broad, shallow basal depressions; surface densely imbricate-granulate.

Abdomen beneath coarsely, densely punctate, and finely granulose on the basal segments, becoming more sparsely and finely punctate toward the apex, the punctures more or less connected transversely by fine, sinuate lines, and uniformly, rather sparsely clothed with short, recumbent, whitish pubescence; first and second segments feebly, broadly, longitudinally flattened, but not densely pubescent; vertical portions of the segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, but not longitudinally carinate. Prosternum coarsely, densely granulose, somewhat rugose, and sparsely clothed with short, inconspicuous hairs; prosternal lobe broad, strongly declivous, and vaguely, broadly emarginate in front; prosternal process rather narrow, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle rectangular. Tibiae slender, the anterior pair slightly arcuate, and all three pairs armed with a long tooth on inner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth acute at apex, the inner one slightly broader, turned inward, and the tip sometimes touching that of the opposite side.

Length, 4.25 mm.; width, 1 mm.

Female.—Differs from the male in having the front of head broader, more convex, occiput slightly grooved, the lateral margins more parallel to each other, the surface aeneous, with a cupreous tinge, and more sparsely pubescent behind the epistoma; pronotum more uniformly aeneous; prosternum more sparsely punctured; first two abdominal segments convex at middle, and the tibiae without a distinct tooth on inner margin at apex.

Redescribed from the type (male) in the collection of J. N. Knull.

Type locality.—Framingham, Mass.

DISTRIBUTION

Material examined:

CONNECTICUT: New Haven, reared (A. B. Champlain); June 10 (B. H. Walden). Manchester, May 20 (Champlain). Hamden, June 20 (Walden). Lyme, May 24 (W. S. Fisher).

ILLINOIS: Beverly Hills, June 15; Palos Park, June 17; Willow Springs, May 22 (E. Liljeblad).

IOWA: Elma, June 14–30 (——).
Lake Okoboji, July 24 (L. Buchanan).

MANITOBA: Winnipeg, July 1 (L. H. Roberts).

MASSACHUSETTS: Framingham, May; Natick, June 5; Sherborn, June 7 (C. A. Frost). Springfield (E. A. Chapin). Melrose, June 10 (C. C. Sperry).

NEW YORK: Olcott, May–July (H. Dietrich).

NORTH CAROLINA: Tryon, May 15 (W. F. Fiske).

PENNSYLVANIA: Charter Oak, June 21 (Kirk and Knull). Harrisburg, May 24; Hummelstown, June 22; Chambersburg, June 6; Berks County, June 1 (J. N. Knull).

Variations.—Length 3.75 to 5.5 millimeters. The front of the head in the male varies from a bright blue to a bronzy green, and in the female from bronzy cupreous to a dark brownish cupreous. The outer joints of the antennae are sometimes as wide as long, the eyes occasionally more acutely rounded beneath than above, and the prosternal lobe is subtruncate or feebly emarginate in front. The median depressions on the pronotum are variable in depth, moderately deep in some examples, and scarcely indicated in others, and the prehumeral carinae are also slightly variable, but never as sharply elevated as in *juglandis*, and in some examples are nearly absent.

Host.—This species has been reared from oak (*Quercus* species) by A. B. Champlain from material collected at New Haven, Conn.

This species resembles *otiosus* very closely, but the absence of the conspicuous pubescence on the prosternum of the male will distinguish it from that species. The male genitalia are also quite different from those of *otiosus* and *juglandis*, being flattened and strongly, arcuately expanded near the apex, whereas in those species the sides are nearly parallel to each other near the apex. The females can not be satisfactorily separated from those of the allied species.

27. AGRILUS JUGLANDIS Knull

Figure 21

Agrilus juglandis KNULL, Ent. News, vol. 31, 1920, pp. 7–8.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 206.—BRITTON, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 244.—NICOLAY, Journ. N. Y. Ent. Soc., vol. 29, 1921, p. 175.—KNULL, Canad. Ent., vol. 54, 1922, p. 85.—FALL, Bull. Brooklyn Ent. Soc., vol. 20, 1925, p. 182.—KNULL, Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 40–41, pl. 1, fig. 2.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 67.

Agrilus otiosus STROMBERG, Canad. Ent., vol. 26, 1894, p. 36 (part).—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, pp. 65–66, 68 (part).—FELT, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 518 (part).—FROST and WEISS, Canad. Ent., vol. 52, 1920, pp. 205–206 (part).—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 9 (part).—FELT, 35th Rept. N. Y. State Ent. for 1921 (1923), p. 90 (part).—CHAMBERLIN, Cat. Buprestidae, 1926, pp. 74–75 (part).

Male.—Form of *masculinus* Horn, and moderately shining; antennae and head green, the latter aeneo-cupreous on the occiput; pronotum bronzy brown, with the sides slightly more greenish; elytra piceous, with a feeble aeneous tinge; beneath black, with a feeble aeneous or greenish reflection, and slightly more shining than above.

Head with the front wide, slightly convex, and about equal in width at top and bottom, the lateral margins vaguely, arcuately expanded at vertex, and with an obsolete, longitudinal, median depression; surface coarsely, sparsely punctate, finely, densely granulose, more or less rugose behind the epistoma, feebly, longitudinally rugose on the occiput, and rather densely clothed on lower half with moderately long, semierect, white pubescence, which does not conceal the surface; epistoma strongly transverse between the antennae, and rather deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, broadly oblong, and about equally rounded above and beneath.

Pronotum three-sevenths wider than long, base and apex about equal in width, and widest just behind the middle; sides obliquely expanded from apical angles to behind middle, where they are feebly, obtusely angulated, then obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal carina is slightly sinuate, the submarginal carina nearly straight, the two carinae rather widely separated at apical fourth, and connected to each other near the base; anterior margin strongly sinuate, with a broadly rounded median lobe; base transversely bisinuate, the median lobe scarcely produced, and feebly emarginate in front of scutellum; disk moderately convex, with two broad, indistinct depressions arranged longitudinally at middle, a deep, broad depression along lateral margin extending from apical fourth to base, and with sharply defined, straight, prehumeral carinae, extending from base to basal third; surface coarsely, densely, transversely rugose, finely, densely granulose, and with numerous fine punctures between the rugae. Scutellum strongly, transversely carinate, and the surface densely reticulate.

Elytra wider than pronotum at base, and about equal in width at base and apical third; sides parallel for a short distance behind base, broadly, arcuately constricted in front of middle, broadly rounded at apical third, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and feebly, irregularly serrulate; sides of abdomen not visible from above; disk feebly convex, sutural margins elevated posteriorly, with broad, moderately deep basal depressions, and without distinct costae; surface densely imbricate-punctate.

Abdomen beneath vaguely granulose, rather coarsely, densely punctate on the basal segments, but becoming more sparsely, finely punctate toward the apex, and sparsely clothed with short, recumbent, whitish pubescence; first and second segments convex, and not depressed or pubescent at middle; vertical portions of the segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, with the median carina feebly elevated, but not projecting. Prosternum densely, finely granulose, with a few shallow punctures intermixed, and sparsely clothed with short, semierect, whitish hairs; prosternal lobe broad, strongly declivous, and broadly, feebly emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then arcuately narrowed to the apex, which is rather acute. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle nearly rectangular. Tibiae slender, and all three pairs armed with a distinct tooth on inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint as long as the following joints united. Tarsal claws similar on all the feet, cleft near the middle, the outer tooth acute at apex, the inner one slightly broader, turned inward, and the tip sometimes touching that of the opposite side.

Length, 5.5 mm.; width, 1.4 mm.

Female.—Differs from the male in having the front of head broader, more convex, aeneo-cupreous, and not so densely pubescent behind the epistoma; prosternum more finely granulose and the pubescence shorter, and the tibiae unarmed at apex.

Redescribed from the type in the collection of J. N. Knull.

Type locality.—Hummelstown, Pa.

DISTRIBUTION

Material examined:

CONNECTICUT: New Haven, June 1; North Guilford, June 16 (M. P. Zappe). Cornwall, June (Frost, Chamberlin). Lyme, reared (Fisher, Champlain).
ILLINOIS: Riverside, June 8 (E. Liljeblad).
MICHIGAN: Detroit, May–June (Hubbard and Schwarz).
NEW YORK: Ilion, *May* (——). Poughkeepsie, June (——).
PENNSYLVANIA: Hummelstown, June; Linglestown; Charter Oak, June 21 (J. N. Knull).
VIRGINIA: Afton (Hubbard and Schwarz).

Variations.—Very little variation was observed in the specimens examined, the color is rather constant, but the sides of the pronotum are sometimes widest along the anterior half, with the margins nearly parallel to each other, or slightly sinuate, the median depressions are more or less variable in depth, and the anterior margin of the prosternal lobe is subtruncate or feebly emarginate. Length, 4.5 to 6 millimeters.

Host.—The larvae of this species live in the outer bark of living butternut (*Juglans cinerea* Linnaeus), and adults have been reared from this host by Knull, Champlain, and Fisher.

This species is closely allied to *frosti* Knull, but in the males the first and second abdominal segments are not longitudinally flattened as in that species, and can be easily separated from it by the genitalia, which is strongly, arcuately expanded at the middle, with the sides nearly parallel to each other toward the apex. The females can not be satisfactorily separated from those of the allied species.

28. AGRILUS PUNCTICEPS LeConte

Agrilus puncticeps LeConte, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 249.—Pettit, Canad. Ent., vol. 2, 1870, p. 102.—Zesch and Reinecke, North Amer. Ent. (Buffalo, N. Y.), vol. 1, 1880, p. vii.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 336.—Frost, Canad. Ent., vol. 44, 1912, p. 249.—Chamberlin, Cat. Buprestidae, 1926, p. 60.

Female.—Form that of *otiosus* Say, and moderately shining; antennae blackish green; head bronzy green, becoming cupreous on the occiput; pronotum brownish cupreous on the median part, and becoming bronzy green toward the sides; elytra brownish black; beneath black, with a more or less aeneous or greenish tinge, and more shining than above.

Head with the front wide, slightly convex, about equal in width at top and bottom, the lateral margins nearly parallel to each other and without a distinct median groove; surface rather coarsely, densely granulose, very coarsely, deeply punctate, becoming longitudinally rugose on the occiput, and sparsely clothed behind the epistoma with long, semierect, white hairs; epistoma transverse between the antennae, and feebly, broadly, arcuately emarginate in front; antennae extending slightly beyond middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, strongly elongate, and about equally rounded above and beneath.

Pronotum one-half wider than long, slightly narrower at base than apex, and widest along apical half, sides nearly parallel from apical angles to middle, then feebly narrowed to near the posterior angles, where they are vaguely sinuate; when viewed from the side the marginal carina is feebly sinuate, the submarginal carina straight, the two carinae rather widely separated anteriorly, and connected to each other near the posterior angles; anterior margin strongly sinuate, with the median lobe strongly, broadly rounded; base strongly, transversely bisinuate, the median lobe feebly produced, and arcuately emarginate in front of scutellum; disk moderately convex, with two round, shallow median depressions, of which the posterior one is slightly more deeply depressed, a broad, deep depression along lateral margin, and with short, sharply defined, prehumeral carinae; surface coarsely, densely granulose, coarsely, densely, transversely rugose, and with numerous fine punctures between the rugae. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, about equal in width at base and apical third, broadly, arcuately constricted in front of middle, and obliquely narrowed from apical third to the tips, which are separately, broadly rounded, and feebly, irregularly serrulate; sides of abdomen slightly exposed above; disk feebly convex, vaguely, longitudinally depressed, sutural margins elevated posteriorly, and with broad, shallow basal depressions; surface densely, coarsely imbricate-punctate.

Abdomen beneath densely, obsoletely granulose, rather densely, coarsely, uniformly punctate, the punctures more or less connected transversely by fine, sinuate lines, which are coarser on basal segment, and rather sparsely, uniformly clothed with short, recumbent, whitish pubescence; first and second segments convex at middle; vertical portions of segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, feebly, longitudinally carinate, but the carinae not projecting. Prosternum finely, densely granulose, somewhat rugose, and sparsely clothed with short, semierect hairs; prosternal lobe broad, strongly declivous, and feebly, arcuately emarginate in front; prosternal process rather narrow, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Posterior coxae with the posterior margin broadly, arcuately emarginate, and the exterior angle rectangular. Tibiae slender, and the anterior and middle pairs armed with a short tooth at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following joints united. Tarsal claws cleft near the middle, the outer tooth acute at apex, the inner one slightly broader, turned inward, and the tip touching that of the opposite side. (Anterior and posterior claws missing.)

Length, 6 mm.; width, 1.5 mm.

Male.—Unknown.

Type locality.—Southern States.

Redescribed from the female type (specimen No. 13, under *egenus* Gory) in the LeConte collection in the Museum of Comparative Zoology, at Cambridge, Mass.

It is rather unfortunate that this species was described from a female, since the females of this and allied species can not be separated. It is possible that *puncticeps* LeConte and *juglandis* Knull are the same species. A female paratype of *juglandis* was compared with the female type of *puncticeps*, and they seem to be identical, both specimens having the coarse, widely separated punctures on the head, but since no constant characters have been found for separating these females, and *juglandis* has been described from reared material of both sexes, it seems advisable to retain both names for the present. In case constant characters are found in the future for separating the females of the *otiosus* group, and these two species should prove to be the same, *puncticeps* will have precedence over *juglandis.*

It is difficult to see how Horn (1891) could have placed *puncticeps* as a synonym of *egenus* Gory, since the two species belong to different groups of the genus, *egenus* having the antennae serrate from the fifth joint, and *puncticeps* serrate from the fourth joint. Chamberlin (1926) gives the host as black locust, but this is the host plant of *egenus*, of which the above species has been erroneously placed as a synonym.

Host.—Unknown.

29. AGRILUS MACER LeConte

Figure 22

Agrilus macer LeConte, Proc. Acad. Nat. Sci. Phila., vol. 10, 1858, p. 70; Journ. Acad. Nat. Sci. Phila., ser. 2, vol. 4, 1858, p. 35; Trans. Amer. Philos. Soc., new ser., vol. 11, 1859, p. 248.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 298-299, pl. 8, fig. 9.—Hamilton, Ent. News, vol. 7, 1896, p. 292; Canad. Ent., vol. 28, 1896, p. 263.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—Schaeffer, Brooklyn Inst. Mus., Sci. Bull. vol. 1, no. 6, 1905, p. 131.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 207.—Chamberlin, Cat. Buprestidae, 1926, p. 69.

Male.—Strongly elongate, distinctly flattened and strongly shining; head aeneous, greenish toward the sides, and becoming brownish cupreous on occiput; pronotum and elytra uniformly brownish cupreous; beneath brownish cupreous, slightly more shining than above, and the legs greenish.

Head with the front rather narrow, slightly, irregularly concave, about equal in width at bottom and top, lateral margins arcuately expanded at middle, and with a distinct, longitudinal groove on the occiput; surface uneven, coarsely, rather densely punctate, somewhat rugose, and sparsely clothed with long, recumbent whitish hairs; epistoma strongly transverse between the antennae, and very broadly, deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, elongate, and about equally rounded above and beneath.

Pronotum nearly one-half wider than long, wider at apex than at base, and widest near apical angles; sides obliquely narrowed from near apical angles to base; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina nearly straight, the two carinae narrowly separated at apical fourth, and connected to each other near the base; anterior margin strongly sinuate, with a feebly rounded median lobe; base distinctly emarginate at middle of each elytron, the median lobe broadly rounded and feebly emarginate or subtruncate in front of scutellum; disk moderately convex, with a broad, shallow median depression behind the middle, a rather broad, deep depression on each side along the lateral margin, and with a distinct, broadly rounded prehumeral carina extending from posterior angle obliquely inward to basal third; surface coarsely, densely, transversely rugose, finely punctate between the rugae, and at the sides sparsely clothed with long, recumbent, yellowish pubescence. Scutellum distinctly, transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base; sides nearly parallel behind base, feebly narrowed to behind the middle, then obliquely attenuate to the tips, which are separately, narrowly rounded, and coarsely serrulate; sides of abdomen narrowly exposed above; disk depressed, with a distinct smooth, longitudinal costa extending from humeri to near the tips, the sutural margins feebly elevated posteriorly, the interval between the sutural margin and longitudinal costa flat, and with broad, shallow basal depressions; surface coarsely, feebly imbricate-punctate, and sparsely clothed with short, recumbent, whitish pubescence.

Abdomen beneath finely, sparsely punctate at the middle, the punctures becoming denser toward the sides, where the surface is rather densely clothed with short, recumbent, yellowish pubescence; vertical portions of the segments densely but not conspicuously clothed with yellowish pubescence; first and second segments convex at middle, and not pubescent; last segment broadly truncate at apex; pygidium with a narrow projecting carina, which is emarginate at apex. Prosternum densely, finely punctate on median parts, the punctures becoming coarser toward the sides, and rather densely clothed at middle with long, erect, inconspicuous hairs; prosternal lobe broad, feebly declivous, broadly rounded or subtruncate in front; prosternal process broad, flat, the sides parallel to behind the coxal cavities, and the apex broadly rounded. Posterior coxae with the posterior margin transverse, strongly sinuate, and the exterior angle rectangular. Tibiae slender, the anterior and middle pairs feebly arcuate, and with a small tooth on the inner margin at apex. Posterior tarsi as long as the tibiae, and the first joint nearly as long as the following joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth long and acute, the inner one short, broader, and not turned inward.

Length, 8.5 mm.; width, 1.8 mm.

Female.—Differs from male in having the front of head broader, antennae slightly shorter; prosternum coarsely punctate at middle and not pubescent; posterior tarsi shorter than tibiae, and the anterior tibiae unarmed at apex.

Redescribed from the male type (no. 1) in the Museum of Comparative Zoölogy, Cambridge, Mass.

Type locality.—Eagle Pass, Tex.

DISTRIBUTION

Material examined:

TEXAS: Eagle Pass (type). La Grange, August 17; Columbus, July 22 (Hubbard and Schwarz). Brownsville, May 28 to June 12, reared (H. S. Barber). Brownwood, May 9 (F. M. Hull). Chisos Mountains, July 20–24 (H. A. Wenzel). New Braunfels, May (H. Mittendorf).

Recorded also from Carmal County, Tex. It has also been recorded from Pennsylvania and Kentucky from erroneously identified or incorrectly labeled specimens.

Variations.—The species is somewhat variable, the color varying from olivaceous green to brownish cupreous, with the pubescence on the head whitish or yellowish white. The median depression on pronotum is slightly variable in depth, and the anterior margin of the prosternum is broadly rounded or feebly, arcuately emarginate. The greatest variation is in the shape of the lateral margins of the pronotum, which is widest at the middle, and the sides are feebly, regularly rounded in some examples, whereas in others the sides are nearly parallel to each other, and the margins are strongly sinuate. Length 8.5 to 16 millimeters.

Host.—This species has been found by Hubbard and Schwarz at Brownsville, Tex., boring in *Celtis*, and H. S. Barber has reared a number of adults from Hackberry (*Celtis occidentalis* Linnaeus) collected at the same locality.

The type of this species is a very small specimen collected by Mr. Schott, and is more brownish cupreous than most of the specimens examined. Horn (1891) states that in the male the front of the head is more concave than in the female, and that the scutellum is scarcely carinate. This statement is incorrect, as the front of the head is about equally concave in both sexes, and the carina on the scutellum is equally distinct in all of the specimens examined of both sexes. Horn also states that in the original description the scutellum is said to be not carinate, but LeConte does not mention the scutellum in his original description, and on examining the type the scutellum was found to be distinctly carinate.

30. AGRILUS PULCHELLUS Bland

Figure 23

Agrilus pulchellus BLAND, Proc. Ent. Soc. Phila., vol. 4, 1865, p. 382.—CROTCH, Proc. Acad. Nat. Sci., Phila., vol. 25, 1873, pp. 93–94.—LECONTE, Proc. Acad. Nat. Sci., Phila., vol. 25, 1873, p. 333.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 312–313; Proc. Calif. Acad. Sci., vol. 4, ser. 2, 1894, pp. 378–379.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—WICKHAM, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 5, no. 3, 1902, p. 269.—SCHAEFFER, Brooklyn Inst. Mus., Sci. Bull. vol. 1, no. 7, 1905, p. 150.—FALL and COCKERELL, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 181.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 210.

Engyaulus pulchellus (Bland) WATERHOUSE, Biol. Centr.-Amer. Coleopt., vol. 3, pt. 1, 1889, p. 50, pl. 4, fig. 9.—GOOD, Ann. Ent. Soc. Amer., vol. 18, 1925, p. 271, pl. 11, fig. 39.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 201.

Agrilus pinalicus WICKHAM, Canad. Ent., vol. 35, 1903, pp. 69–70 (new synonymy).—FALL and COCKERELL, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 180.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 76.

Female.—Form subcylindrical, moderately robust, slightly flattened above, and rather strongly shining; head greenish blue, with a feeble violaceous tinge in front; pronotum blue, with a feeble violaceous reflection; elytra blue along sutural margins, narrowly margined golden green internally, and with the lateral two-thirds reddish cupreous; beneath black, and the legs dark green.

Head with the front narrow, strongly declivous anteriorly, and vaguely wider at top than at bottom, the lateral margins feebly expanded from bottom to top, and with a broad, very deep, median depression, almost bilobed, extending from vertex to epistoma; surface coarsely, densely, irregularly rugose, densely, coarsely punctate between the rugae, and sparsely clothed with long, recumbent, whitish pubescence in the depression; epistoma very narrow between the antennae, and very broadly, deeply, arcuately emarginate in front; antennae nearly contiguous at base, robust, extending slightly beyond anterior margin of pronotum, serrate from the fourth joint, and the outer joints distinctly wider than long; eyes large, broadly oblong, and equally rounded above and beneath.

Pronotum slightly wider than long, about equal in width at base and apex, and widest near middle; sides feebly, arcuately rounded from apical angles to behind middle, then more obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal carina is feebly sinuate, the submarginal carina nearly straight, and the two carinae widely separated anteriorly ; anterior margin feebly sinuate, with the median lobe vaguely rounded; base transversely truncate to middle of each elytron, then broadly rounded to the scutellum, in front of which it is subtruncate;

disk moderately convex, with two broad, shallow, median depressions placed longitudinally, the anterior one being slightly deeper, a broad, shallow depression on each side along lateral margin, and without distinct prehumeral carinae; surface coarsely, deeply, irregularly rugose, finely, sparsely punctate between the rugae, and clothed with a few long hairs in the depressions. Scutellum not transversely carinate, but the surface coarsely rugose.

Elytra wider than pronotum at base, and distinctly wider at base than behind middle; side feebly rounded for a short distance behind base, strongly, broadly constricted in front of middle, feebly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and feebly serrulate; sides of abdomen broadly exposed above; disk feebly flattened, with broad, moderately deep basal depressions; surface densely, coarsely granulate-muricate, transversely rugose toward the sides, and with a vague vitta of short, whitish hairs, extending along suture from basal depression to apex.

Abdomen beneath coarsely, densely punctate, the punctures connected transversely by coarse, sinuate lines, and densely clothed at the sides with short, recumbent, silvery white pubescence, which extends narrowly along anterior margin of segments to middle; first segment convex at middle; last segment broadly rounded at apex; suture between first and second segments distinct at the sides; vertical portions of segments not conspicuously pubescent; pygidium densely punctate, strongly carinate, the carina not projecting, but the apex of the pygidium acutely angulated. Prosternum obsoletely granulose, coarsely punctate, more or less rugose, and sparsely clothed with moderately long, recumbent, whitish hairs; prosternal lobe broad, strongly declivous, and broadly but not deeply, arcuately emarginate in front; prosternal process broad, arcuately declivous toward apex, the sides nearly parallel to behind coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, and without a tooth at apex. Posterior tarsi about one-half as long as tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth slightly shorter than outer one, and not turned inward.

Length, 9.5 mm.; width, 2.5 mm.

Male.—Differs from the female in having the front of head golden green, with a feeble cupreous tinge; antennae extending nearly to middle of pronotum; abdomen beneath cupreous, aeneous or greenish, with the sides sometimes blackish, and the surface more coarsely punctate; anterior and middle tibiae armed with a distinct tooth on inner margin at apex, and the tarsal claws similar on all feet, cleft near the tip, the teeth nearly equal in length, and not turned inward at the tip.

Redescribed from the female type, No. 3294, in the Academy of Natural Sciences of Philadelphia.

Type locality.—Of *pulchellus*, Colorado. Of *pinalicus*, Parker's well, east side of Organ Mountains, N. Mex. Type in collection of H. F. Wickham.

DISTRIBUTION

Material examined:

ARIZONA: San Bernardino Ranch, Cochise County, 3,750 feet (E. G. Smyth and F. H. Snow). Santa Rita Mountains, July, 5,000–8,000 feet (F. H. Snow, Hubbard, and Schwarz). Oracle, July 2 (Hubbard and Schwarz). Coyote Mountains, August 4–7, 3,500 feet (Chamberlin Coll). Reef. Cochise County, Baboquivari Mountains, Schaeffer Cañon, October 18–19, 1924, 5,160–5,500 feet (Rehn and Hebard).

COLORADO: Denver, July 20–22 (Stoner). Colorado Springs, August 10, 1889 (H. Soltau).

KANSAS: Belvidere, Kiowa County, July (W. Knaus). Clark County, June (F. H. Snow). Linn and Bourbon Counties (R. H. Beamer).

MEXICO: Tepehuanes; Chihuahua (H. F. Wickham).

NEW MEXICO: Parker's Well, October (T. D. A. Cockerell). Koehler, July 23 (D. J. Caffrey). Carlsbad, August 25, and Sandia Mountains, July 29 (Rehn and Hebard).

TEXAS: Kent, Culberson County, September 17–18, 3,800–4,200 feet (Rehn and Hebard).

Recorded also from:

ARIZONA: Pinal Mountains, June (—). Huachuca Mountains, July 5; Nogales, October 3.

COLORADO: Fort Collins, July 16.

MEXICO: Sonora.

NEW MEXICO: Rowe.

TEXAS: Brownsville, August 14.

Variations.—This species is quite variable in coloration, and the head in the male varies from golden green with a feeble cupreous tinge to entirely reddish cupreous, the sides of the elytra bronzy cupreous to reddish cupreous, and the sutural area from green to purplish black. In some examples the longitudinal carina on the pygidium is strongly elevated and distinctly projecting, whereas in others the apex of the pygidium is simply obtusely angulated. Length, 6.5 to 10 millimeters.

Host.—Found breeding in the roots of Fleabane (*Erigeron* species) in Arizona by Hubbard and Schwarz.

Prof. H. F. Wickham, who has kindly sent me his type of *pinalicus* for study, suggested that it was probably synonymous with *pulchellus* Bland. I have carefully studied his type and compared it with the type of *pulchellus* and can not find any specific differences. In the type of *pinalicus* the bluish black sutural area is very narrow, and the efflorescence is well preserved, which gives it a distinct whitish appearance.

Waterhouse (1889) erected the genus *Engyaulus* for this and a closely allied species from Mexico, and which he separates from *Agrilus* by the front being convex, the mouth consequently more inferior, and the first joint of the posterior tarsi being short. These characters are of no generic value, as there are a number of species which could be placed in either genus on these characters, so I concur with Horn (1891) in not retaining *Engyaulus* as a valid genus.

31. AGRILUS VITTATICOLLIS (Randall)

Figure 24

Buprestis (*Agrilus*) *vittaticollis* RANDALL, Boston Journ. Nat. Hist., vol. 2, 1838, pp. 38–39.

Agrilus vittaticollis (Randall) LECONTE, Trans. Amer. Philos. Soc., new ser., vol. 11, 1859, p. 250.—CROTCH, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 96.—SPRAGUE and AUSTIN, Proc. Boston Soc. Nat. Hist., vol. 17, 1875, p. 376.—SCHWARZ, Proc. Amer. Philos. Soc., vol. 17, 1878, p. 452.—HUBBARD and SCHWARZ, Proc. Amer. Philos. Soc., vol. 17, 1878, p. 636.—BLANCHARD, Ent. Amer., vol. 5, 1889, p. 32.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 299–300.—HAMILTON, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—SMITH, 27th Rept. N. J. State Board Agric. for 1899 (1900), suppl. p. 257.—FELT, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 720.—FALL, Ent. News, vol. 17, 1906, p. 168.—SMITH, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295.—BLATCHLEY, Coleoptera of Indiana, 1910, p. 800.—MANEE, Ent. News, vol. 24, 1913, p. 170.—BROOKS, U. S. Dept. Agric., Journ. Agric. Research, vol. 3, 1914, pp. 179–186, pls. 29–31 (life history).—NICOLAY, Bull. Brooklyn Ent. Soc., vol. 12, 1917, p. 94.—CHAMBERLIN, Ent. News, vol. 28, 1917, p. 169.—FISHER, Proc. Ent. Soc. Wash., vol. 20, 1918, p. 68.—BRITTON, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 245.—KNULL, Ent. News, vol. 31, 1920, p. 10.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 207.—FROST, Canad. Ent., vol. 52, 1920, p. 26.—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, pp. 14–15.—WELLHOUSE, Cornell Agric. Exp. Sta., Mem. 56, 1922, pp. 1050–1108.—KNULL, Canad. Ent., vol. 54, 1922, p. 86; Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 43–44.—CHAMBERLIN, Journ. N. Y. Ent. Soc., vol. 32, 1925, p. 193; Cat. Buprestidae, 1926, pp. 85–86.

Agrilus frenatus DEJEAN, Cat. Coleopt., ed. 2, 1833, p. 82; ed. 3, 1837, p. 93 (no description).—GORY, Mon. Bupr., suppl., vol. 4, 1841, pp. 239–240, pl. 40, fig. 231.—LECONTE, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9.

Male.—Form robust and rather strongly flattened; head and pronotum purplish red, sometimes with an aeneous tinge, and feebly shining; elytra black, opaque, beneath black, with a strong purplish tinge, and more shining than above.

Head with the front rather wide, slightly wider at top than at bottom, the vertex broadly concave, the occiput more deeply impressed, the concavity extending to the lateral margins, which are feebly, arcuately expanded at the middle, and with a narrow, longitudinal groove extending from the occiput to the epistoma; surface finely, closely rugose, rather densely, finely punctate, and densely clothed with long, recumbent, golden yellow hairs, except on the vertex and along upper half of the eyes; epistoma rather wide between the antennae, and broadly, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes rather large, narrowly oblong, and about equally rounded above and beneath.

Pronotum at least one-half wider than long, the base and apex about equal in width, and widest at middle; sides strongly, arcuately rounded; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina nearly straight, the two carinae rather widely separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, with a broadly rounded median lobe; base distinctly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, with a broad, shallow, median depression extending from base nearly to apex, a broad, shallow depression on each side along lateral margin, and without prehumeral carinae; surface closely, coarsely rugose, the rugae oblique in front, transverse near the base, finely punctate between the rugae, with a median band of golden pubescence extending from base to anterior margin, and a broader band of similar pubescence along the lateral margins, the hind angles sometimes not pubescent. Scutellum usually feebly, transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base, about equal in width at base and apical third, deeply, broadly, arcuately constricted in front of middle, and arcuately attenuate from apical third to the tips, which are separately, broadly rounded, and strongly serrulate; sides of abdomen broadly exposed above; disk slightly flattened, without trace of costae, the sutural margins slightly elevated near apex, and the basal foveae broadly, and rather deeply impressed; surface finely, densely imbricate-punctate, and not pubescent.

Abdomen beneath finely punctate and granulose, sparsely along the median line, more densely at the sides, especially on the first two segments, which are also slightly rugose, rather densely clothed with short, recumbent, whitish hairs; vertical portions of the segments densely clothed with golden yellow pubescence; first segment slightly flattened at middle and rugose, the second with a feeble longitudinal depression; last segment obtuse or truncate at apex; pygidium coarsely punctate, strongly carinate, the carina projecting and truncate at apex. Prosternum finely, densely punctate, somewhat rugose, and sparsely clothed with short, whitish hairs;

prosternal lobe broad, strongly declivous, and broadly rounded or subtruncate in front; prosternal process broad, the sides parallel to behind the coxal cavities where they are usually bent downward and forming a tooth, then abruptly narrowed to the apex. Posterior coxae with the posterior margin transversely sinuate, and the exterior angle rectangular. Tibiae slender, feebly arcuate, and all three pairs with a strong tooth on the inner margin at apex. Posterior tarsi not quite as long as the tibiae, and the first joint about equal in length to the following three joints united. Tarsal claws dissimilar, anterior ones cleft near the tip, middle ones slightly more deeply cleft, and the posterior ones cleft near the middle, the teeth about equal in width, and the inner one sometimes feebly turned inward, but the tips widely separated.

Female.—Differs from the male in having the first two abdominal segments convex at middle; posterior tarsi slightly shorter; tibiae unarmed at apex, and the tarsal claws similar on all feet, cleft near the middle, the inner tooth slightly shorter than the outer one, and feebly turned inward at the tip, but the tips widely separated.

Length, 8–9.75 mm.; width, 2–2.75 mm.

Redescribed from material collected at Tyngsboro, Massachusetts.

Type locality.—Cambridge, Mass.

Present location of type unknown to the writer, but Sprague and Austin (1875) say that the Randall collection is lost.

DISTRIBUTION

Material examined:

ALABAMA: Spring Hill, May 10 (H. P. Loding).

CONNECTICUT: New Haven, June 1 (M. P. Zappe).

ILLINOIS: No definite locality.

MARYLAND: Beltsville, July 14 (R. C. Shannon).

MASSACHUSETTS: Sherborn, June 8; Framingham (C. A. Frost). Tyngsboro, June 21; West Springfield; Chicopee (——).

MICHIGAN: Escanaba, July 13 (Hubbard and Schwarz).

NEVADA: No definite locality (Horn Coll.).

NEW HAMPSHIRE: Webster (——).

NEW YORK: Ithaca, July 14 (H. Dietrich).

OREGON: Corvallis, June 23 (B. G. Thompson).

PENNSYLVANIA: Notch, June 10 (T. E. Snyder). Endeavor, July 30 (Knull and Kirk). Charter Oak, June, July (Champlain, Kirk and Knull). Benton; Hummelstown (Knull). Highspire; Inglenook; Harrisburg, June, July (Fisher). Asaph (——); Jeannette (Klages).

VIRGINIA: HOT SPRINGS, July 5; Hayfield; Winchester; Staunton (F. E. Brooks).

WEST VIRGINIA: French Creek; Cherry Run; Sleepy Creek; Springfield; Moorefield; Romney; Keyser; Elkins; Junior (F. E. Brooks).

Also recorded from:

CALIFORNIA: Carrville (Chamberlin).

FLORIDA: Enterprise (E. A. Schwarz).

MAINE: Douglas Hill, July 8 (A. Nicolay).

New Jersey: Hewitt, June; Newfoundland, July; Lakehurst, July (Joutel). Buena Vista (Liebeck). Clementon, May 30 (Greene). Sea Isle, June (Boerner). Husted, May (Weiss); Otco (Wenzel). Fort Lee (Schaeffer).
New York: West Point.
North Carolina: Southern Pines (Manee); Tryon (error=*fuscipennis* Gory).
Oregon: Josephine County, May 8 (Nunenmacher); Grants Pass, July 9.
Rhode Island: Providence, April 12.

Variations.—There is scarcely any variation in the form and color in the examples examined, and as a rule the sides of the pronotum are more densely pubescent anteriorly than toward the posterior angles, but occasionally a specimen will be found with the sides uniformly pubescent. The claws are more deeply cleft in some examples than in others, and the inner tooth is slightly turned inward, but they should not be placed with those species having the tips contiguous, as in all of the examples examined the tips were widely separated. Horn states that the prosternum in the female is less densely punctured and more shining than in the male, but this seems to be more of an individual variation than sexual.

Hosts.—The larvae of this species attacks the roots and lower trunk of service berry or shad bush (*Amelanchier canadensis* (Linnaeus) Medicus), wild thorn (*Crataegus* sp.), apple, pear, wild crab (*Pyrus* spp.), and the adults have been found a number of times feeding on the foliage of the choke cherry (*Prunus* sp.) which is probably also a host for the larvae.

This species is closely allied to *audax* Horn and *benjamini* Fisher, but can be separated from both of these species by the propleurae, metapleurae, mesopleurae, and coxae not being densely pubescent.

32. AGRILUS BENJAMINI, new species

Figure 25

Agrilus audax Chamberlin, Cat. Buprestidae, 1926, p. 52 (part).

Male.—Form resembling *vittaticollis* Randall; head and pronotum black, with a feeble purplish red tinge, and subopaque; elytra black, opaque; beneath black, with a feeble aeneous reflection, and strongly shining.

Head with the front wide, slightly wider at top than at bottom, very deeply and broadly concave on the vertex and occiput, lateral margins feebly, arcuately expanded at middle, and with a narrow, longitudinal groove extending from the occiput to epistoma; surface finely, closely rugose, densely, finely punctate between the rugae, and densely clothed on lower half with long, recumbent, yellowish and reddish-yellow pubescence; epistoma rather narrow between the antennae, and broadly, deeply emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, strongly elongate, and about equally rounded above and beneath.

Pronotum at least one-half wider than long, base slightly wider than apex, and widest at middle; sides strongly arcuately rounded; when viewed from the side the marginal carina is slightly sinuate, the submarginal carina sinuate and only feebly indicated; anterior margin strongly sinuate, with a broadly rounded median lobe; base strongly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, with a rather deep, broad, median depression not quite extending to base or apex, a broad, shallow depression on each side along lateral margin, and without prehumeral carinae; surface closely, finely, irregularly rugose, finely, densely punctate between the rugae, with a median band of densely placed yellow and reddish-yellow pubescence not quite extending to base or anterior margin, and a large triangular area of similar pubescence covering the lateral third of pronotum. Scutellum transversely carinate, and the surface densely reticulate.

Elytra about as wide as pronotum at base, about equal in width at base and apical third, deeply, broadly, arcuately constricted at middle, and arcuately attenuate from apical third to the tips, which are separately, broadly rounded, and finely serrulate; sides of abdomen broadly exposed above; disk feebly flattened, without longitudinal costae, but with broad, deep, basal depressions; surface finely, densely imbricate-punctate, and not pubescent.

Abdomen beneath finely, densely punctate, obsoletely granulose, more coarsely, densely punctate, and strongly rugose on the first two segments, especially on the first, and moderately clothed with short, recumbent, whitish hairs; vertical portions of the segments densely clothed with long, recumbent, golden-yellow pubescence; first segment scarcely flattened, the second segment with a narrow, obsolete groove, extending from base to near the posterior margin of the segment; last segment subtruncate at apex; pygidium coarsely punctate, strongly carinate, the carina projecting and truncate at apex. Prosternum densely, coarsely punctate, coarsely rugose or scabrous, and sparsely clothed with short, whitish hairs; prosternal lobe broad, strongly declivous, and broadly rounded or subtruncate in front; prosternal process broad, the sides parallel to behind the coxal cavities, without dentiform reflexion of the edge, then abruptly narrowed to the apex, which is acute. Posterior coxae with the posterior margin tranversely truncate, and the exterior angle rectangular. Tibiae slender, nearly straight, and all three pairs with a feeble tooth on the inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint about equal in length to the following three joints united. Tarsal claws nearly similar on all feet, cleft near the middle, the outer tooth long and acute, the inner one slightly shorter and broader, and sometimes feebly turned inward, but the tips widely separated.

Length, 8 mm.; width, 2.25 mm.

Female.—Differs from the male in being more robust, front of head broader, with the lateral margins more parallel to each other and not strongly constricted toward the bottom, the first two abdominal segments convex at the middle, and the tibiae unarmed at the apex.

Length, 11 mm.; width, 3 mm.

Type locality.—Victoria, Tex.

Other localities.—Kerrville and Colorado County, Tex., and Kansas (no definite locality).

Type and paratype.—Cat. No. 40992, U.S.N.M.

Allotype.—University of Kansas. *Paratype* in collection of J. N. Knull.

Described from four specimens, two males and two females. The type collected at Victoria, Tex., March 26, 1908, on oak (*Quercus* sp.) by J. D. Mitchell; allotype collected in Colorado County, Tex., April 24, 1922, by Mrs. Grace Wiley; one male paratype collected at Kerrville, Tex., April 12, 1907, by F. C. Pratt, and one female paratype labeled "Kan." (Knull collection).

This species is closely allied to *audax* Horn and *vittaticollis* Randall. From the latter it can be separated by the propleurae, mesopleurae, metapleurae and coxae being densely pubescent, and from *audax* by the head being deeply depressed in front, with only the lower half densely pubescent. In *audax* the males have a deep, smooth, elongate depression on the second abdominal segment, whereas in *benjamini*, the second abdominal segment is only feebly depressed.

I take much pleasure in naming this species after Dr. Marcus Benjamin as a slight acknowledgment of the many courtesies shown the writer.

33. AGRILUS AUDAX Horn

Figure 26

Agrilus audax Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 300–301.—Wickham, Canad. Ent., vol. 35, 1903, p. 70.—Fisher, Proc. Ent. Soc. Wash., vol. 20, 1918, p. 68.—Chamberlin, Cat. Buprestidae, 1926, p. 52 (part).

Male.—Form resembling *vittaticollis* Randall; head bronzy green in front, becoming cupreous or purplish on the occiput; pronotum purplish red, and feebly shining; elytra black, opaque; beneath aeneous, with a slightly cupreous reflection, and more shining than above.

Head with the front rather wide, distinctly wider at top than at bottom, vertex and occiput broadly concave, the concavity extending on the vertex to the lateral margins, which are feebly, arcuately expanded at middle, and with a narrow, longitudinal groove extending from the occiput to epistoma; surface densely rugose, finely granulose, densely, coarsely punctate, and rather densely clothed with long, recumbent, yellowish hairs over entire surface; epistoma rather wide between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, strongly elongate, and about equally rounded above and beneath.

Pronotum one-half wider than long, base slightly wider than apex, and widest at middle; sides moderately, arcuately rounded; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina feebly sinuate, the two carinae rather widely separated anteriorly, and connected to each other near the base; anterior margin slightly sinuate, with a broadly rounded median lobe; base strongly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate or feebly emarginate in front of scutellum; disk moderately convex, with a broad, shallow median depression extending from base nearly to apex, a broad, shallow depression on each side along lateral margin, and without prehumeral carinae; surface closely, coarsely, transversely rugose, finely, rather densely punctate between the rugae and in the depressions, with a median band of yellowish pubescence extending from base to near the anterior margin, and a broader band of similar pubescence along lateral margins. Scutellum feebly, transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base, about equal in width at base and apical third, deeply, broadly, arcuately constricted near middle, and arcuately attenuate from apical third to the tips, which are separately, broadly rounded, and rather coarsely serrulate; sides of abdomen broadly exposed above; disk slightly flattened, with feebly indicated longitudinal costae, and broad, deep basal depressions; surface finely, densely imbricate-punctate, and not pubescent.

Abdomen beneath finely, densely punctate, obsoletely granulose, more coarsely punctate and rugose on the first two segments, and rather densely clothed with short, recumbent, whitish hairs; vertical portions of the segments densely clothed with recumbent, golden yellow pubescence; first segment slightly, broadly flattened at middle, the second with a deep, smooth groove, which is wider in front, and extending three-fourths to the posterior margin of the segment; last segment obtuse or subtruncate at apex; pygidium coarsely punctate, strongly carinate, the carina projecting and truncate at apex. Prosternum coarsely, densely punctate, coarsely rugose, and sparsely clothed with short, whitish hairs; prosternal lobe broad, strongly declivous, and broadly rounded or subtruncate in front; prosternal process broad, the sides parallel to behind the coxal cavities, without dentiform reflexion of the edge, then abruptly narrowed to the apex, which is acute. Tibiae slender, feebly arcuate, and the anterior and middle pairs with a small tooth on the inner margin at apex, the posterior pair simple. Posterior tarsi distinctly shorter than tibiae, and the first joint about equal in length to the following three joints united. Tarsal claws dissimilar, anterior ones cleft near the tip, middle ones slightly more deeply cleft, and the posterior ones cleft near the middle, the teeth about equal in width, and the inner one sometimes feebly turned inward.

Length, 9 mm.; width, 2.5 mm.

Female.—Differs from the male in having the front of head violaceous cupreous, lateral sides nearly parallel, and the surface more sparsely punctate; first and second abdominal segments convex at middle, and without a median groove; tibiae unarmed at apex, and the claws cleft near the middle, the inner tooth broad and very short.

Redescribed from the lectotype No. 3478 in the Academy of Natural Sciences of Philadelphia.

Type locality.—Texas.

Distribution.—Material examined. Texas: No definite locality.

Variations.—No variation was observed in the few examples examined except in size, which varied in length from 9 to 10 millimeters.

Host.—Unknown.

This species seems to be rare in collections, as only four specimens have been examined by the writer, all of which are probably from the Belfrage collection. Chamberlin (1926) records it from Arizona and Illinois, but the latter record is probably from an erroneously identified or incorrectly labeled specimen. He also records a specimen in the United States National Museum from Kerrville, Tex., but this is the new species *benjamini* described above. The species is closely allied to *vittaticollis* Randall and *benjamini* Fisher, but can be separated from both these species by the characters given in the table.

34. AGRILUS PILOSICOLLIS, new species

Female.—Form resembling *granulatus* Say, feebly shining, and slightly flattened above; olivaceous brown, with the head and pronotum more or less cupreous; elytra ornamented with yellow pubescent spots; beneath cupreous, and more shining than above.

Head with the front rather wide, nearly flat, about equal in width at bottom and top, the lateral margins arcuately expanded at vertex, and with a longitudinal groove extending from the occiput to the epistoma, the groove broadly and rather deeply depressed on the vertex and occiput; surface coarsely, densely punctate, the punctures more or less transversely confluent, and rather densely clothed on lower half with moderately long, recumbent, golden yellow pubescence; epistoma narrow, not transverse between the antennae, and broadly, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints slightly longer than wide; eyes large, narrowly oblong, and about equally rounded above and beneath.

Pronotum one-half wider than long, base and apex about equal in width, and widest just behind the middle; sides strongly, arcuately expanded from apical angles to just behind the middle, then arcuately narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are strongly sinuate, widely separated anteriorly, and connected to each other near the base; anterior margin feebly sinuate, with the median lobe broadly, vaguely rounded; base arcuately emarginate at middle of each elytron, the median lobe very broadly rounded, and subtruncate in front of scutellum; disk moderately convex, with a broad, moderately deep, median depression extending from base to near anterior margin, a broad, shallow depression on each side along the lateral margin, and without prehumeral carinae; surface densely, coarsely but not deeply, transversely rugose, finely punctate between the rugae, sparsely clothed with inconspicuous hairs on the median part, but densely, broadly clothed at the sides with moderately long, recumbent, golden yellow pubescence, which conceals the surface. Scutellum rather strongly, transversely carinate, and the surface obsoletely reticulate.

Elytra slightly wider than pronotum at base, and distinctly wider at base than at apical third; sides feebly arcuately rounded for a short distance behind base, broadly constricted in front of middle, broadly, arcuately expanded at apical third, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and coarsely serrulate; sides of abdomen broadly exposed above; disk rather strongly flattened above, and without longitudinal costae, the sutural margins slightly elevated posteriorly, and with broad, moderately deep, basal depressions; surface densely coarsely imbricate-punctate, sparsely clothed with short, inconspicuous hairs, which are more distinct along sutural margins at apical fourth, and each elytron ornamented with three small golden yellow pubescent spots, one in basal depression, one in front of middle, and the other one near the apical fourth.

Abdomen beneath finely, sparsely punctate at middle, becoming densely punctate toward the sides, sparsely clothed with short, recumbent hairs, and with a large spot of longer, densely placed, golden yellow pubescence at the sides of each segment; first and second segments convex, and smooth at middle; last segment rounded at apex; vertical portions of all the segments densely clothed with golden yellow pubescence; pygidium coarsely punctate and strongly carinate, the carina strongly projecting, and truncate at apex. Prosternum coarsely, rather densely punctate, sparsely clothed with short, inconspicuous hairs at the middle, but the episternum densely clothed with recumbent golden yellow pubescence; prosternal lobe rather narrow, moderately declivous, and broadly rounded or subtruncate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then strongly narrowed to the apex, which is acute. Sides of sternum and posterior coxae densely clothed with recumbent, golden yellow pubescence. Tibiae slender, straight, and the anterior and middle pairs armed with a very short tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint about as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the teeth nearly equal in length, and the inner tooth turned slightly inward, but the tips distant.

Length, 10.5 mm.; width, 2.75 mm.

Male.—Unknown.

Type locality.—Garden City, Kans.

Type.—Cat. No. 40993, U.S.N.M.

Described from a single female collected at the type locality, June 18, 1914, by F. B. Milliken.

Superficially this species resembles *granulatus* Say very closely, but in that species the front of head is densely pubescent and scarcely depressed on the vertex; epistoma strongly transverse between the antennae; pronotum not conspicuously pubescent at the sides, but with sharply defined prehumeral carinae; elytra more distinctly pubescent; prosternal lobe arcuately emarginate at middle; vertical portions of second abdominal segment glabrous; pubescence at sides of abdomen and sternum not so conspicuous, and the inner tooth of the tarsal claws shorter than the outer one, and not turned inward.

35. AGRILUS BILINEATUS (Weber)

Figure 27

Buprestis bilineata Weber, Obser. Ent., No. 5, 1801, pp. 74–75.—Illiger, Mag. Insektenkunde, vol. 1, pt. 9, 1801, p. 248.—Melsheimer, Cat. Ins. Penna., 1806. p. 45, no. 1009.—Schonherr, Syn. Ins., vol. 1, pt. 3, 1817, p. 213, no. 9.—Say, Ann. Lyc. Nat. Hist. New York, vol. 1, pt. 2, 1825. pp. 250–251.

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Smith, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295.—Metcalf and Collins, U. S. Dept. Agric., Farmers' Bull. 467, 1911, p. 10.—Smith, Ent. Rept. N. J. Agric. Exp. Sta. for 1910 (1911), p. 348.—Felt, 27th Rept. N. Y. State Ent. for 1911 (1912), pp. 113–114, 131, fig. 5.—Ruggles, Minn. State Ent., Circ. 25, 1912, p. 2, fig. 2.—Washburn, 14th Rept. Minn. State Ent., 1912, p. 55, figs. 35–36; Journ. Econ. Ent., vol. 5, 1912, p. 180.—Beal, U. S. Dept. Agric., Bur. Biol. Survey, Bull. 44, 1912, p. 47.—Frost, Canad. Ent., vol. 44, 1912, p. 252.—Manee, Ent. News, vol. 24, 1913, p. 170.—Brooks, U. S. Dept. Agric., Journ. Agric. Research, vol. 3, no. 2, 1914, p. 184.—Burgess, U. S. Dept. Agric., Farmers' Bull. 564, 1914, p. 5.—Felt, Journ. Econ. Ent., vol. 7, 1914, p. 373.—Ruggles, Minn. State Ent., Circ. 30, 1914, pp. 7–8, fig. 1; 15th Rept. Minn. State Ent., 1914, pp. 54–55, fig.—Howard, U. S. Dept. Agric., Ent. Rept. 1914, pp. 11–12.—Anderson and Rankin, Cornell Agric. Exp. Sta., Bull. 347, 1914, p. 586.—Britton, 13th Rept. Conn. State Ent. for 1913 (1914), pp. 250–251, pl. 12, fig. *b*.—Felt, Journ. Econ. Ent., vol. 7, 1914, p. 373.—Frost, Canad. Ent., vol. 47, 1915, p. 144.—Felt, 29th Rept. N. Y. State Ent. for 1913 (1915), pp. 9, 73.—Craighead, Journ. Econ. Ent., vol. 8, 1915, p. 440.—Chapman, U. S. Dept. Agric., Journ. Agric. Research, vol. 3, no. 4, 1915, pp. 283–294, pls. 38–39 (life history).—Burgess, U. S. Dept. Agric., Bull. 204, 1915, p. 19.—Beal, U. S. Dept. Agric., Bull. 280, 1915, p. 7.—(———) Tree Talk vol. 4, 1916, p. 26.—Felt, 31st Rept. N. Y. State Ent. for 1915 (1916), pp. 11, 71–75; N. Y. State Mus., Bull. 180, 1916, p. 116; Country Life in America, vol. 29, no. 5, 1916, p. 74; N. Y. State Mus., Bull. 186, 1916, p. 11.—Hopkins, Journ. Econ. Ent., vol. 9, 1916, p. 323.—Britton, Journ. Econ. Ent., vol. 9, 1916, pp. 450, 576.—Burke, U. S. Dept. Agric., Bull. 437, 1917, p. 3, pl. 6, fig. 2.—Morris, 47th Rept. Ent. Soc. Ontario for 1916 (1917), p. 22 (probably var. *carpini* Knull).—Clement and Munro, U. S. Dept. Agric., Bull. 484, 1917, p. 4.—Burgess, U. S. Dept. Agric., Farmers' Bull. 845, 1917, p. 7.—Chagnon, 9th Rept. Quebec Soc. Protec. Plants, Suppl. pt. 3, 1917, p. 219.—Craighead, Journ. Econ. Ent., vol. 10, 1917, p. 568.—Washburn, Inj. Ins., 1918, pp. 275–277, fig. 283.—Ruggles, 17th Rept. Minn. State Ent., 1918, pp. 15, 16.—Morris, Canad. Ent., vol. 51, 1919, p. 52 (probably var. *carpini* Knull).—Nicolay, Bull. Brooklyn Ent. Soc., vol. 14, 1919, p. 19.—Chapman, Ann. Ent. Soc. Amer., vol. 13, 1920, pp. 176–177.—Frost and Weiss, Canad. Ent., vol. 52, 1920, pp. 207–208.—Knull, Ent. News, vol. 31, 1920, p. 10.—Hollister, Journ. Econ. Ent., vol. 13, 1920, p. 146.—Weiss and West, Proc. Biol. Soc. Wash., vol. 33, 1920, p. 3.—(———) Journ Econ. Ent., vol. 13, 1920, p. 13.—Britton, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 244.—Kotinsky, U. S. Dept. Agric., Farmers' Bull. 1169, 1921, pp. 61–63.—Weiss, Ent. News, vol. 32, 1921, p. 46.—Lord, Care of Shade Trees, 1922, p. 46.—Kirk, Ent. News, vol. 33, 1922, p. 238.—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Insp., Circ. 48, 1922, pp. 7–8, figs. 4–5, pl. 1, figs. 6*a*–6*b*.—Knull, Canad. Ent., vol. 54, 1922, p. 83.—Champlain and Knull, Canad. Ent., vol. 55, 1923, p. 114.—Felt, Man. Tree and Shrub Ins., 1924, pp. 53–54. fig. 17.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 44, pl. 1, figs. 8, 33, 34; pl. 6, fig. 3.—Essig, Ins. Western North Amer., 1926, p. 403.—Chamberlin, Cat. Buprestidae, 1926, pp. 54–55.

Agrilus bivittatus Kirby, Fauna Boreali Americana, vol. 4, 1837, p. 161, no. 215.—White, Nomenclature Coleopt. Ins. Brit. Mus., pt. 3, 1848, p. 38.—Bethune, Canad. Ent., vol. 4, 1872, p. 35.

Agrilus trivittatus Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 335 (typ. error for *bivittatus* Kirby).

Agrilus aurolineatus Gory, Mon. Bupr. Suppl., vol. 4, 1841, pp. 248–249. pl. 41, fig. 241.—LeConte, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9.

Male.—Form elongate, rather slender, and feebly flattened above; head bronzy green; pronotum black, opaque, and sometimes with a feeble greenish or aeneo-cupreous tinge; elytra black, opaque, with a more or less distinct greenish or bluish tinge; beneath dark bronzy green, sometimes with a feeble cupreous reflection, and strongly shining.

Head with the front narrow, feebly convex, about equal in width at bottom and at top, lateral margins strongly, arcuately expanded at middle, and with a feeble, narrow, longitudinal groove extending from the occiput to middle of front; surface coarsely, densely punctate or scabrous in front, becoming longitudinally rugose on the occiput, and sparsely clothed with short, semierect hairs, epistoma narrow between the antennae, and broadly, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints slightly longer than wide; eyes large, rather broadly oblong, and slightly more broadly rounded beneath than above.

Pronotum one-half wider than long, the base distinctly narrower than apex, and widest along apical fourth; sides nearly parallel or feebly arcuate from apical angles to middle, then obliquely narrowed to the posterior angles; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina straight or feebly sinuate, the two carinae rather widely separated anteriorly, and connected to each other near the base; anterior margin strongly emarginate, with a broadly rounded median lobe; base slightly emarginate at middle of each elytron, the median lobe broadly rounded, and broadly truncate in front of scutellum; disk moderately convex, with two round, feeble, median depressions, one near anterior margin, the other near the base, a rather deep depression on each side along lateral margin, and without prehumeral carinae; surface densely, transversely rugose on the median part, with a few fine punctures between the rugae, becoming finely, densely punctate toward the sides, which are broadly, densely clothed with rather long, recumbent, golden yellow or whitish pubescence. Scutellum strongly, transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base and slightly wider at base than at apical third; sides nearly parallel for a short distance behind base, deeply, broadly, arcuately constricted in front of middle and arcuately attenuate from apical third to the tips, which are separately, rather broadly rounded, and strongly serrulate; sides of abdomen broadly exposed above; disk rather strongly flattened, without longitudinal costae, sutural margins slightly elevated from apical third to tip, and with broad, moderately deep, basal depressions; surface densely, coarsely imbricate-punctate, and with a narrow vitta of rather dense yellowish or whitish pubescence extending from the basal depression to the apex (sometimes the vitta only distinct in the basal depressions).

Abdomen beneath finely and sparsely punctate along the middle, more densely and coarsely at the sides, becoming coarsely rugose on the basal segments, and sparsely clothed with short, recumbent, cinereous hairs; first segment slightly flattened at the middle, the second with a deep, smooth groove, which is wider in front, and extending two thirds to the posterior margin of segment; last segment broadly rounded at apex; vertical portions of the segments densely clothed with yellowish or whitish pubescence; pygidium coarsely punctate, strongly carinate, the carina projecting and truncate at apex. Prosternum densely punctate, slightly rugose, and sparsely clothed with short, cinereous hairs; prosternal lobe broad, strongly declivous, and broadly rounded or subtruncate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, nearly straight, the anterior and middle pairs with a small tooth on the inner margin near apex, and the posterior pair simple. Posterior tarsi distinctly shorter than tibiae, and the first joint about equal in length to the following three joints united. Tarsal claws dissimilar, anterior and middle ones cleft near the tip and the teeth nearly equal in length, the posterior ones cleft near the middle, the inner tooth slightly shorter and feebly turned inward, but the tips distant.

Female.—Differs from the male in being usually more robust; head brownish black with a more or less distinct aeneous or cupreous tinge slightly more convex, front much broader, sides nearly parallel, slightly narrower at top than at bottom, surface not quite so densely punctured, the longitudinal groove more deeply impressed on occiput, and the eyes narrower and more broadly rounded above than beneath; abdomen with the second ventral segment convex, and not grooved at the middle; prosternum shining and more finely punctate; tibiae unarmed at apex, and the tarsal claws similar on all feet, cleft near the middle, the inner tooth slightly shorter, and feebly turned inward, but the tips widely separated.

Length, 4.25–9.5 mm.; width, 1–2.25 mm.

Type locality.—Of *bilineatus*, "America"; present location of type unknown to writer. Of *flavolineatus*, North America; type presumably in the Dejean collection. Of *bivittatus*, Canada; type presumably in the British Museum. Of *aurolineatus*, North America; type presumably in the Dejean collection.

Distribution.—This species has a wide distribution, being found in eastern Canada (Ontario and Quebec), and throughout the United States from Maine westward to the Rocky Mountains, and southward to Texas. Material has been examined from various localities in the following States: Arkansas, Connecticut, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Maryland, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Texas, Virginia, West Virginia, and Wisconsin.

Variations.—This species shows considerable variation in size, as a result of their food plant becoming too dry, and causing the larvae to pupate prematurely. The pubescence forming the lateral spaces on the pronotum and the vittae on the elytra varies from golden yellow to white, with all intermediate shades. Usually these pubescent vittae are entire, extending from the basal depressions to the tips of the elytra, but frequently examples are found in which the vittae are only indicated near the basal depressions.

Hosts.—Attacks white oak (*Quercus alba* Linnaeus), red oak (*Quercus rubra* Linnaeus), black oak (*Quercus velutina* La Marck), scarlet oak (*Quercus coccinea* Muenchhausen), burr oak (*Quercus macrocarpa*), and chesnut (*Castanea dentata* (Marshall) Borkhausen). It will probably attack any of the oaks, and becomes very injurious to trees which have been weakened by other insects, plant diseases, or climatic conditions. Some writers record this species as killing more oaks than any other species of insect so far discovered. All of the records of *bilineatus* recorded from beech (*Fagus* sp.) should probably be referred to the variety *carpini* Knull.

This is one of the best known species of *Agrilus* found in North America, and on account of the great amount of damage it causes to oak and chestnut trees it has received the attention of entomologists in all parts of the country. It is usually recorded in the economic literature under the "Two lined chestnut borer," which was adopted as the common name for this species by the American Association of Economic Entomologists. Mannerheim (1837) described this species as *flavolineatus* from a specimen under that name in the Dejean Collection, and Gory (1841) redescribed it under the name of *aurolineatus* from the same specimen. Essig (1926) records this species as girdling oak trees in Colorado, but this is incorrect.

35a. AGRILUS BILINEATUS subspecies CARPINI Knull

Agrilus bilineatus var. *azureus* KNULL, Canad. Ent., vol. 54, 1922, p. 84 (name preoccupied).

Agrilus bilineatus var. *carpini* KNULL, Canad. Ent., vol. 55, 1923, p. 105; Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 44, pl. 9, fig. 2.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 55.

Agrilus bilineatus (Weber) MORRIS, 47th Rept. Ent. Soc. Ontario for 1916 (1917), p. 22; Canad. Ent., vol. 51, 1919, p. 52, (probably this subspecies).

Male.—Form resembling a typical specimen of *bilineatus;* head bronzy green on the front, becoming brownish black on the occiput, pronotum brownish black at the middle, becomingly narrowly bronzy green toward the lateral margins, where the surface is sparsely clothed with short, recumbent, golden yellow hairs; elytra bright cyaneous blue, with a spot of short, recumbent, golden yellow hairs in the basal depressions, and a vague vitta of shorter whitish hairs along the sutural margins at apical fifth; beneath olivaceous green, with the episternum, external side of posterior coxae, and the vertical portions of the abdominal segments densely clothed with short, recumbent, golden yellow hairs. Genitalia the same as in *bilineatus* Weber.

Length, 8 mm.; width, 1.9 mm.

Redescribed from the male type in the collection of J. N. Knull, which was reared June 2, 1920, from blue beech (*Carpinus caroliniana* Walter).

Type locality.—Hummelstown, Pa.

DISTRIBUTION

Material examined:

CONNECTICUT: Lyme (W. S. Fisher).

PENNSYLVANIA: Philadelphia, June (F. M. Trimble and J. K. Primm): Hummelstown (J. N. Knull). Harrisburg (Champlain and Knull).

Variations.—This subspecies is rather uniform in size, but considerable variation was found in examining a series of male and female paratypes reared or collected on blue beech at Philadelphia, Pa. Some specimens have the elytra bright cyaneous blue, whereas in others it is nearly black with a feeble greenish tinge. The pubescence is always visible in the basal depressions, and sometimes along the sutural margins near apex, and varies from a golden yellow to a yellowish white color. In a series reared from ironwood (*Ostrya virginiana* (Miller) Koch) at Lyme, Conn. by the writer, there are indications of a vague pubescent vitta on each elytron on a few of the examples, whereas in others it is absent except in the basal depressions. Length 6.25 to 8 millimeters.

Hosts.—Breeds in living beech (*Fagus grandifolia* Ehrhart, syn. *F. americana* Sweet), blue beech (*Carpinus caroliniana* Walter), and ironwood or hop-hornbeam (*Ostrya virginiana* (Miller) Koch).

36. AGRILUS QUERCICOLA, new species

Figure 28

Agrilus acutipennis var., Britton, Journ. Econ. Ent., vol. 9, 1916, p. 384.
Agrilus acutipennis Burke (not Mannerheim), Journ. Econ. Ent., vol. 10, 1917, p. 331.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 247.—Chamberlin, Cat. Buprestidae, 1926, pp. 47–48 (part).

Male.—Form slightly more slender than *quadriimpressus* Ziegler, feebly shining, and feebly flattened above; head and pronotum green, and usually with a cupreous or aureus tinge; elytra black, with a feeble violaceous or greenish tinge; beneath green, sometimes with an aeneous tinge, and more shining than above.

Head with the front rather narrow, nearly flat, about equal in width at top and bottom, only obsoletely impressed on the occiput, lateral margins slightly, arcuately rounded at middle, and with a narrow, longitudinal groove extending from occiput to middle of front; surface coarsely, densely punctate in front, becoming longitudinally rugose on the occiput, and sparsely clothed with short, inconspicuous hairs, which are more distinct near the epistoma; epistoma rather wide between the antennae, and broadly, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large and about equally rounded above and beneath.

Pronotum not quite one-half wider than long, the base and apex about equal in width, and widest in front of middle; sides feebly, arcuately rounded from apical angles to behind the middle, then more obliquely narrowed to the posterior angles; when viewed from the side the marginal carina is strongly sinuate anteriorly, the submarginal carina straight or feebly sinuate, the two carinae narrowly separated anteriorly, and connected to each other at the base; anterior margin feebly sinuate, with a broadly rounded median lobe; base slightly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, with a broad, obsolete depression in front of scutellum (sometimes evenly convex and without any depression), a broad, shallow depression on each side along margin, and without prehumeral carinae; surface densely, coarsely, transversely rugose on median part, densely granulose and finely punctate between the rugae, becoming more coarsely punctate toward the sides, and without distinct pubescence. Scutellum strongly, transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base, about equal in width at base and apical third; sides nearly parallel for a short distance behind base, slightly, broadly, arcuately constricted in front of middle, arcuately rounded at apical third, then obliquely attenuate to the tips, which are separately, broadly rounded, and strongly serrulate; sides of abdomen broadly exposed above; disk feebly flattened, without longitudinal costae, sutural margins feebly elevated at apical third, and with broad, moderately deep basal depressions; surface finely, densely imbricate-punctate, without distinct pubescence, except sometimes with a few short white hairs at the tips.

Abdomen beneath rather finely and densely punctate, becoming somewhat rugose on the basal segment, and sparsely clothed with short, recumbent, whitish pubescense; first segment strongly flattened or feebly concave at the middle, the second with a deep, smooth groove, which has the sides parallel, and extending to about the middle of the segment; last segment broadly rounded at apex; vertical portions of segments rather densely clothed with recumbent, whitish pubescence; pygidium coarsely punctate, strongly carinate, the carina projecting and truncate at apex. Prosternum coarsely, densely, punctate, coarsely rugose, and sparsely clothed with inconspicuous hairs; prosternal lobe broad, strongly declivous, and broadly rounded in front; prosternal process broad, surface some times concave, and the sides parallel to behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, nearly straight, the middle and anterior pairs with a distinct tooth on the inner margin at apex, and the posterior pair simple. Posterior tarsi distinctly shorter than the tibiae, and the first joint about equal in length to the following three joints united. Tarsal claws dissimilar, anterior ones cleft near the tip, and the teeth nearly equal in length; middle and posterior claws cleft near the middle, the inner tooth shorter than the outer one, and slightly turned inward, but the tips distant.

Female.—Differs from the male in having the front of head wider, slightly more convex, longitudinal groove more deeply impressed, sides more parallel, and slightly narrower at top than at bottom, the antennae shorter, and eyes narrower; abdomen beneath more finely, sparsely punctate, more sparsely pubescent, and the first two segments convex at the middle; prosternum not quite so densely punctate and rugose; tooth at apex of anterior and middle tibiae shorter and more indistinct, and the claws alike on all the feet, similar to those on the posterior feet of the male.

Length, 5.75–8.75 mm.; width, 1.5–2.25 mm.

Type locality.—North Cheyenne Canyon, Colo.

Other localities.—Arizona: Flagstaff, July 5, and Williams, June 9 (Barber and Schwarz). Colorado: Colorado Springs, June 15 (H. F. Wickham). New Mexico: Las Vegas (——). Utah: American Fork Canyon, June 23 (Hubbard and Schwarz).

Type, allotype, and paratypes.—Cat. No. 40994, U.S.N.M. Paratypes in the collections of H. F. Wickham, C. A. Frost, Illinois Natural History Survey, and the Academy of Natural Sciences of Philadelphia

Described from 32 specimens (one type). Thirteen were collected at the type locality during July, some of which were reared from Gambel's Oak (*Quercus utahensis* (A. de Candolle) Rydberg. Syn. *Q. gambelii* Nuttall) by George Hofer; one collected July 18, 1917, at the same locality by T. E. Snyder; 9 from Las Vegas, N. Mex.; 6 from American Fork Canyon, Utah; one from Colorado Springs, Colo.; one from Flagstaff, and one from Williams, Ariz.

The specimens examined are rather uniform in size, but the color of the head and pronotum varies from dark green to golden green, and sometimes with a slight cupreous tinge.

This species is confused in collections with *acutipennis*, but can be separated from that species by being distinctly bicolored on the dorsal surface.

37. AGRILUS CRIDDLEI Frost

Figure 29

Agrilus criddlei Frost, Canad. Ent., vol. 52, 1920, pp. 249–250.—Nicolay, Journ. N. Y. Ent. Soc., vol. 29, 1921, p. 175.—Chamberlin, Cat. Buprestidae, 1926, p. 57.

Male.—Form resembling *anxius*, moderately shining, and feebly flattened above, bronzy black, with a slightly bluish and cupreous reflection; beneath slightly more bronzy and shining than above, and with a distinct cupreous tinge.

Head with the front wide, nearly flat, about equal in width at bottom and top, without distinct depressions, lateral margins nearly parallel, only feebly expanded at middle, and with a narrow, longitudinal groove extending from occiput to middle of front; surface coarsely, densely punctate, the punctures more or less confluent, and sparsely clothed with short, inconspicuous, semierect, whitish hairs; epistoma wide between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending beyond middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes moderately large, and about equally rounded above and beneath.

Pronotum one-half wider than long, base and apex about equal in width, and widest at middle; sides slightly, arcuately rounded; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina nearly straight, the two carinae widely separated anteriorly, and connected to each other at the base; anterior margin rather deeply sinuate, with a broadly rounded median lobe; base feebly emarginate at middle of each elytron, the median lobe broadly rounded, and truncate in front of scutellum; disk moderately convex, with a broad, rather deep depression in front of scutellum, a vague depression on each side in front of middle, a small, deeper depression on each side along base near posterior angles, a broad, shallow depression on each side along lateral margins, and a more or less distinct, elongate swelling near the posterior angles instead of the prehumeral carina; surface finely, densely, transversely rugose, finely punctate between the rugae, and sparsely clothed with short, inconspicuous hairs. Scutellum not transversely carinate, and the surface obsoletely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and apical third; sides nearly parallel for a short distance behind the base, feebly, broadly, arcuately constricted in front of midde, broadly, arcuately expanded at apical third, then obliquely attenuate to the tips, which are separately, narrowly rounded, and strongly serrulate; sides of abdomen broadly exposed above; disk feebly flattened, without longitudinal costae, the sutural margins rather strongly elevated behind the middle, and with broad, rather shallow, basal depressions; surface densely, coarsely imbricate-punctate, and sparsely, uniformly clothed with short, recumbent, whitish hairs.

Abdomen beneath finely, sparsely punctate along the middle, more densely toward the sides, becoming coarsely, transversely rugose on the basal segment, and sparsely clothed with short, recumbent, whitish pubescence; first segment broadly concave at middle, the second with a rather broad, deep, smooth groove, which is wider in front than behind, and extending from the anterior margin of segment to near the posterior margin; last segment feebly emarginate or subtruncate at apex; vertical portions of the segments not conspicuously pubescent; pygidium strongly carinate, the carina projecting and truncate at apex. Prosternum coarsely punctate, strongly rugose, and sparsely clothed with short, semierect, whitish hairs; prosternal lobe moderately broad, strongly declivous, and broadly rounded in front, with a feeble emargination at the middle; prosternal process broad, the sides parallel to behind the coxal cavities, then strongly attenuate to the apex, which is acute. Tibiae slender, nearly straight, anterior and middle pairs with a small tooth on the inner margin at apex, and the posterior pair simple. Posterior tarsi about as long as the tibiae, and the first joint about equal in length to the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the teeth slender, nearly equal in length, and the inner tooth not turned inward.

Length, 7.5 mm.; width, 2 mm.

Female.—Differs from the male in being usually more robust, front of head broader, slightly more depressed on vertex, more sparsely punctured; antennae extending only to middle of pronotum; scutellum feebly carinate; prosternum more sparsely punctured; first abdominal segment feebly flattened, and more sparsely punctured and shining; second abdominal segment not grooved at middle, and the last abdominal segment broadly rounded at apex. (Tibiae and tarsi missing.)

Redescribed from the male type in the collection of C. A. Frost.

Type locality.—Aweme, Manitoba.

DISTRIBUTION

Material examined:

Manitoba: Aweme, June 25 (N. Criddle).
Michigan: No definite locality.
Ontario: Toronto (——).
Quebec: Rigaud. (——).

Variations.—In some examples the head is a little more deeply depressed and more greenish than in others, the depression on the pronotum is somewhat variable in depth, and the scutellum is vaguely carinate. In one example there are indications of a longitudinal costa on each elytron, due to the sutural region being vaguely depressed, and the anterior margin of the prosternal lobe is broadly rounded without any emargination at the middle. Length 6.5 to 9 millimeters.

Host.—Unknown.

This species may be confused in collections with *anxius*, but in *criddlei* the pronotum is without distinct prehumeral carinae (sometimes with an obtuse swelling near the posterior angles), the males have the claws cleft alike on all the feet, and the lateral lobes of the genitalia are only feebly expanded near the tips, with the median lobe acute at the apex.

38. AGRILUS OLIVACEONIGER, new species

Agrilus acutipennis Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 308 (part).—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67 (part).—Frost, Canad. Ent., vol. 44, 1912, p. 252.—Chamberlin, Cat. Buprestidae, 1926, pp. 47–48 (part).

Male.—Form similar to *quadriimpressus* Ziegler, feebly shining, and slightly flattened above; olivaceous to brownish black, with a slight aeneous tinge, and the head and pronotum more or less cupreous; beneath more cupreous and shining than above.

Head with the front wide, feebly convex, slightly narrower at bottom than at top, longitudinally impressed on the occiput and vertex, lateral margins obliquely expanded from base to middle, where they are feebly, arcuately rounded, and with a rather deep, longitudinal groove extending from the occiput to middle of front; surface coarsely, densely punctate in front, becoming more or less longitudinally rugose on the occiput, and sparsely clothed with regularly placed, moderately long, recumbent whitish hairs; epistoma narrow between the antennae, and broadly, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, and slightly more broadly rounded beneath than above.

Pronotum about one-half wider than long, the base and apex about equal in width, and widest at middle; sides rather strongly, arcuately rounded; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina moderately sinuate, the two carinae narrowly separated anteriorly, and connected to each other at base; anterior margin moderately sinuate, with a broadly rounded median lobe; base rather strongly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of the scutellum; disk moderately convex, with a broad, moderately deep depression in front of scutellum, from one to three small depressions placed transversely on anterior part of disk (some of these usually indistinct), a broad, deep depression on each side along lateral margin, and without prehumeral carinae; surface coarsely, transversely rugose on the median part, with numerous fine punctures between the rugae, becoming coarsely punctate toward the sides, and sparsely clothed with regularly placed, short, recumbent, whitish hairs. Scutellum feebly, transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base, about equal in width at base and apical third; sides nearly parallel for a short distance behind the base, broadly, arcuately constricted in front of middle, arcuately rounded at apical third, then obliquely narrowed to the tips, which are separately, broadly rounded, and strongly serrulate; sides of abdomen broadly exposed above; disk feebly flattened, without longitudinal costae, sutural margins slightly elevated posteriorly, and with broad, deep basal depressions; surface finely, densely imbricate-punctate, and sparsely clothed over entire surface with uniformly placed, short, recumbent, whitish hairs.

Abdomen beneath finely and sparsely punctate along the middle, more densely toward the sides, becoming somewhat rugose at sides of basal segment, and rather densely clothed with short, recumbent, whitish pubescence; first segiment feebly flattened at middle, the second with a deep, smooth groove, which has the sides nearly parallel, and extending from the anterior margin to apical third; last segment broadly rounded at apex; vertical portions of the segments densely clothed with recumbent, whitish or yellowish pubescence; pygidium coarsely punctate, strongly carinate, the carina projecting and truncate at apex. Prosternum sparsely, coarsely punctate, and sparsely clothed with short, recumbent, whitish hairs; prosternal lobe broad, slightly declivous, and broadly rounded in front; proternal process broad, surface more or less concave, and the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, anterior pair feebly arcuate, anterior and middle pairs with a distinct tooth on the inner margin at apex, the posterior pair simple. Posterior tarsi distinctly shorter than the tibiae, and the first joint about equal in length to the following three joints united. Tarsal claws dissimilar, anterior and middle ones cleft near the tip (middle ones slightly deeper), and the teeth nearly equal in length; posterior claws cleft near middle, the inner tooth shorter than outer one, and slightly turned inward, but the tips distant. Genitalia similar to those of *acutipennis* Mannerheim.

Female.—Similar to the male, but the front of head is wider, more convex, longitudinal groove slightly more deeply impressed, and the sides more parallel; antennae slightly shorter, eyes narrower, and equally rounded above and beneath; abdomen beneath more finely, sparsely punctate, and the second segment not grooved at the middle; tooth at apex of anterior and middle tibiae shorter and less distinct, and the claws alike on all feet, similar to those on the posterior feet of the male.

Length, 7.5–11 mm.; width, 2–3.25 mm.

Type locality.—Massachusetts (probably Tyngsboro).

Other localities.—Connecticut: Lyme. Massachusetts: Sherborn, North Saugus, Stoughton, Springfield, Framingham, and Melrose Highlands.

Type, allotype, and paratypes.—Cat. No. 40995, U.S.N.M. Paratypes in the collections of C. A. Frost, W. J. Chamberlin, and W. Knaus.

Described from 15 specimens (one type). Type, allotype, and one paratype labeled "Mass (Blanchard)" probably from Tyngsboro; 1 from Sherborn, Mass., June 3; 1 collected at Stoughton, Mass., on May 27 by D. H. Blake; 2 collected at North Saugus June 16 by E. A. Back; 3 collected at Springfield, Mass., during June by E. A. Chapin; 1 from Melrose Highlands, Mass., collected on June 3 by D. H. Clemons; 2 collected at Framingham, Mass., during June by C. A. Frost; 1 unlabeled from the Melsheimer Collection; and 1 collected at Lyme, Conn., May 16 on *Betula lenta* Linnaeus by the writer.

This species resembles *criddlei* Frost very closely, but can be separated from that species by having the vertical portions of the abdominal segments densely clothed with whitish or yellowish pubescence. It is the olivaceous variety mentioned by Horn (1891) as being confined to the more northern regions of the country, and which Blanchard records as having been taken on the foliage of poplar sprouts.

39. AGRILUS ACUTIPENNIS Mannerheim

Figure 30

Agrilus acutipennis Dejean, Cat. Coleopt., ed. 2, 1833, p. 82; ed. 3. 1837, p. 93 (no description).—Mannerheim, Bull. Soc. Imp. Nat. Moscou, vol. 10, no. 8, 1837, p. 109.—Gory, Mon. Bupr., Suppl., vol. 4, 1841, pp. 225–226, pl. 37, fig. 216.—LeConte, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9.—Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 93.—Hubbard and Schwarz, Proc. Amer. Philos. Soc., vol. 17, 1878, p. 656.—Blanchard, Ent. Amer., vol. 5, 1889, p. 32.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 307–309 (part).—Laurent, Ent. News, vol. 4, 1893, p. 7.—Harrington, Canad. Ent., vol. 26, 1894, p. 11.—Horn, Proc. Calif. Acad. Sci., ser. 2, vol. 4, 1894, p. 378.—Smith, Insect Life, vol. 7, 1894, pp. 189–191 (This is *sinuatus* Olivier); Ent. News, vol. 5, 1894, p. 323 (This is *sinuatus* Olivier); Garden and Forest, vol. 7, 1894, pp. 373–374, fig. 60 (This is *sinuatus*).—Hamilton, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67 (part).—Smith, 27th Ann. Rept. N. J. State Board Agric. for 1899 (1900), suppl. p. 257.—Ouellet, Le Naturaliste Canadien, vol. 29, 1902, p. 120.—Fletcher, 36th Rept. Ent. Soc. Ontario for 1905 (1906), p. 101.—Felt, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 701.—Fall, Ent. News, vol. 17, 1906, p. 168.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 6, 1909 (author's ed.) p. 23.—Easton, Psyche, vol. 16, 1909, p. 50.—Blatchley, Coleoptera of Indiana, 1910, p. 801.—Smith, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295.—Frost, Canad. Ent., vol. 44, 1912, p. 252. (This is *olivaceoniger*).—Johnson, Ent. News, vol. 27, 1916, p. 117.—Nicolay, Bull. Brooklyn Ent. Soc., vol. 12, 1917, p. 93.—Chagnon, 9th Rept. Quebec Soc. Protection Plants, Suppl. pt. 3, 1917, p. 219.—Burke, Journ. Econ. Ent., vol. 10, 1917, p. 331 (This is *quercicola*).—Gibson, 48th Rept. Ent. Soc. Ontario for 1917 (1918), p. 112.—Nicolay, Bull. Brooklyn Ent. Soc., vol. 14, 1919, p. 19.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 210; Canad. Ent., vol. 52, 1920, p. 247 (This is *quercicola*).—Frost, Canad, Ent., vol. 52, 1920, p. 28.—Britton Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 244.—Knull, Canad. Ent., vol. 54, 1922, p. 84.—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 3.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 46, pl. 1, fig. 7.—Chamberlin, Cat. Buprestidae, 1926, pp. 47–48 (part).

Agrilus latebrus, Castelnau and Gory, Mon. Bupr., vol. 2, 1839, *Agrilus*, p. 38, pl. 9, fig. 50.—LeConte, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9; Trans. Amer. Philos. Soc., new ser., vol. 11, 1859, pp. 246–247.

Male.—Form moderately robust, feebly shining, and more or less flattened above; above dark blue, with a more or less distinct blackish or greenish tinge; beneath varying from dark blue to blackish green, sometimes with a distinct aeneous tinge, and more shining than above.

Head with the front rather wide, nearly flat, distinctly narrower at bottom than at top, rather deeply impressed or concave on the vertex and occiput, lateral margins arcuately expanded at the middle, and with a narrow longitudinal groove extending from the occiput to middle of front; surface coarsely, densely punctate on the front, becoming rugose on the occiput, and sparsely clothed with short, obsolete, whitish hairs; epistoma narrow between the antennae, and broadly, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fourth joint, and the outer joints usually slightly longer than wide; eyes large, and slightly more broadly rounded beneath than above.

Pronotum nearly one-half wider than long, base and apex about equal in width, and widest at middle; sides regularly, arcuately rounded; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina less strongly sinuate, the two carinae rather narrowly separated anteriorly, and connected to each other at the base; anterior margin feebly sinuate, with a broadly rounded median lobe; base rather deeply emarginate at middle of each elytron, the median lobe broadly rounded, and truncate in front of the scutellum; disk moderately convex, with a median depression divided at the middle, the anterior part usually obsolete and the posterior part distinct and more deeply and broadly impressed, sometimes with a small depression on each side toward anterior margin, a small depression on each side along base near posterior angles, a broad, deep depression along lateral margins, and without distinct prehumeral carinae; surface coarsely, densely, transversely rugose, densely punctate between the rugae, and without distinct pubescence except sometimes in the lateral depressions. Scutellum transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and apical third; sides nearly parallel for a short distance behind the base, broadly, arcuately constricted in front of middle, arcuately expanded at apical third, then obliquely attenuate to the tips, which are separately, rather broadly rounded, and strongly serrulate; sides of abdomen broadly exposed above; disk strongly flattened, sometimes the junction of the discal flattened portion with the convex sides of the elytra has the appearance of an obtuse costa, sutural margins slightly elevated near the apex, and with broad, deep, basal depressions; surface coarsely, densely imbricate-punctate, and without distinct pubescence.

Abdomen beneath rather densely, finely punctate, densely, transversely rugose at sides of basal segment, sparsely clothed with short, recumbent, whitish hairs, and usually with a slightly more densely pubescent spot at the sides of the segments; first segment broadly flattened at middle, the second with a deep, smooth groove extending from the anterior margin to behind the middle; last segment broadly rounded at apex; vertical portions of the segments clothed with moderately long, recumbent, whitish pubescence, except the second, which is glabrous; pygidium coarsely punctate, strongly carinate, the carina projecting and truncate at apex. Prosternum sparsely, finely punctate, somewhat rugose, and sparsely clothed with very short, white hairs; prosternal lobe broad, strongly declivous, broadly rounded in front, and sometimes with a very feeble emargination at the middle; prosternal process broad, surface sometimes feebly, longitudinally impressed, the sides parallel to behind the coxal cavities, then strongly attenuate to the apex, which is acute. Tibiae slender, nearly straight (sometimes the anterior pair feebly arcuate), anterior and middle pairs with a small tooth on inner margin at apex, the posterior pair simple. Posterior tarsi distinctly shorter than tibiae, the first joint about equal in length to the following three joints united. Tarsal claws dissimilar, the anterior and middle pairs cleft near the tip, and the teeth nearly equal in length; posterior claws more deeply cleft, and the teeth feebly turned inward.

Female.—Similar to the male, but is more robust, front of head wider, the sides more parallel, and about equal in width at bottom and top; eyes narrower, and equally rounded above and beneath; antennae slightly shorter; first and second abdominal segments convex and not grooved at the middle, and the tarsal claws similar on all feet, cleft near the middle, the teeth about equal in length, the inner tooth slightly turned inward, but the tips distant.

Length, 7.5–10 mm.; width, 1.75–2.75 mm.

Type locality.—Of *acutipennis*, North America; type presumably in the Dejean Collection. Of *latebrus*, Carolina; present location of type unknown to writer.

Distribution.—Material has been examined from Canada (Ontario and Quebec), and from various localities in the following States: Colorado, Connecticut, Florida, Illinois, Indiana, Iowa, Kansas, Massachusetts, Maine, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Texas, Virginia, and Wisconsin.

Variations.—This species is more or less variable, the color varying from a brilliant blue to black. The depressions on the pronotum show considerable variation, and the prehumeral carinae are vaguely indicated in some examples, but they are very obtuse and more of the form of a swelling than a carina, and the tips of the elytra are usually broadly rounded, but occasionally a specimen is found in which the tips are subacute.

Hosts.—The larval habits of this species are unknown, but the adults have been collected on oak (*Quercus* sp.), birch (*Betula* sp.), poplar (*Populus* sp.) and hazelnut (*Corylus americana* Walter). Chamberlin (1926) records it as breeding in *Quercus gambelii* Nuttall, but this record refers to *quercicola*.

Horn (1891) writes that the anterior and middle tibiae of the females are unarmed, but this statement is incorrect as both these pairs of tibiae are armed with a small tooth at the apex.

40. AGRILUS AURICOMUS Frost

Agrilus auricomus Frost, Canad. Ent., vol. 44, 1912, pp. 250–252; Canad. Ent., vol. 52, 1920, pp. 28, 250–251.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 210.—Britton, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 244.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, p. 46.—Chamberlin, Cat. Buprestidae, 1926, p. 53.

Male.—Form robust, moderately shining, and rather strongly flattened above; head aureo-aeneous; pronotum aeneous, with a more or less distinct cupreous tinge; elytra black, with a vague olivaceous reflection; beneath aeneous, with a feeble cupreous tinge, and more shining than above.

Head with the front rather wide, nearly flat, slightly narrower at bottom than at top, lateral margins arcuately expanded at the middle, and with a narrow, longitudinal groove extending from occiput nearly to the epistoma, and more deeply impressed on the occiput and vertex; surface densely, coarsely punctate, becoming more or less rugose on occiput, and sparsely clothed with long, semierect, yellowish hairs; epistoma rather narrow between the antennae, and broadly but not deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints slightly longer than wide; eyes large, strongly elongate, and about equally rounded above and beneath.

Pronotum one-half wider than long, base and apex about equal in width, and widest at middle; sides regularly, arcuately rounded; when viewed from the side the marginal carina is strongly sinuate, the submarginal one less strongly so, the two carinae narrowly separated anteriorly, and connected to each other at the base; anterior margin strongly sinuate, with a broadly rounded median lobe; base feebly emarginate at middle of each elytron, the median lobe broadly rounded, and truncate in front of scutellum; disk moderately convex, with a broad, shallow median depression, which is vaguely divided at middle, a small depression on each side along base near posterior angles, a broad, deep depression on each side along lateral margins, and without distinct prehumeral carinae; surface rather deeply, closely, transversely rugose, finely punctate between the rugae, and sparsely clothed with recumbent, yellowish hairs in the lateral depressions. Scutellum transversely carinate, the carina strongly interrupted at the middle, and the surface finely reticulate.

Elytra slightly wider than pronotum at base, distinctly wider at base than at apical third; sides nearly parallel for a short distance behind base, strongly, broadly, arcuately constricted in front of middle, feebly, arcuately expanded at apical third, then obliquely attenuate to the tips, which are separately, narrowly rounded, and strongly serrulate; sides of abdomen broadly exposed above; disk rather strongly flattened, the juncture of the discal flattened portion with the convex sides of the elytra has the appearance of an obtuse costa curving inward from the humeri and vanishing behind the middle, the sutural margins feebly elevated posteriorly, and with deep, very broad, basal depressions; surface densely, coarsely, imbricate-punctate, without distinct pubescence, except for a narrow, obsolete vitta of short, sparsely placed, yellowish hairs along the sutural margin at apical fourth.

Abdomen beneath finely, sparsely punctate along the middle, more densely toward the sides, becoming densely, transversely rugose on the basal segment, sparsely clothed with short, recumbent, yellowish hairs, and with a slightly more densely pubescent spot at the sides of the segments; first segment distinctly flattened at the middle, the second with a rather wide, deep, smooth groove, which has the sides nearly parallel, and extending from anterior margin of segment to posterior third; last segment broadly truncate at apex; vertical portions of the segments densely clothed with recumbent yellowish pubescence; pygidium strongly carinate, the carina projecting and truncate at apex. Prosternum finely, densely punctate, somewhat rugose, and sparsely clothed with short, whitish hairs; prosternal lobe broad, strongly declivous, and broadly rounded in front; prosternal process broad, the sides parallel to behind the coxal cavities, then strongly attenuate to the apex, which is acute. Tibiae slender, nearly straight, and anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint about equal in length to the following three joints united. Tarsal claws dissimilar, anterior ones cleft near the tip, and the teeth nearly equal in length; middle and posterior claws cleft near middle, the inner tooth shorter than the outer one, slightly turned inward, but the tips distant. (Claws on anterior tarsi missing on type). Genitalia similar to *acutipennis* Mannerheim.

Length, 9.6 mm.; width, 2.5 mm.

Female.—Differs from the male in being more robust, not so attenuate posteriorly; front of head slightly broader and more cupreous; antennae slightly shorter and the outer joints as wide as long; first and second abdominal segments convex, and without a groove at middle; last abdominal segment more broadly rounded at apex;

vertical portion of abdominal segments more broadly visible above, and the tarsal claws similar on all feet, cleft near the middle, the inner tooth slightly shorter than outer one, slightly turned inward, but the tips distant.

Redescribed from the male type (except the anterior claws) in the collection of C. A. Frost.

Type locality.—Framingham, Mass.

DISTRIBUTION

Material examined:

Connecticut: New Haven, June 12; Portland, June 5; and Hamden, June 20 (B. H. Walden). Lyme, May–June (Fisher, Champlain).

Massachusetts: Framingham, May 31–June 14; Sherborn, July 29; and Hubbardston (C. A. Frost).

Pennsylvania: Delaware County, May 19; Castle Rock (G. M. Greene).

Variations.—This species shows considerable variation. The color of the elytra varying from olivaceous black to olivaceous brown, and the front of the head in the males from green to bronzy brown. Pronotum with the median depression somewhat variable in depth, sometimes with a small round depression on each side of the middle, the lateral margins are nearly parallel to each other at the middle, and rarely with vague prehumeral carinae. Scutellum usually with the transverse carina entire, but occasionally it is interrupted at the middle. The elytra are usually rather acutely rounded at the tips, and in some examples the longitudinal costae are scarcely indicated. The color beneath varies from olivaceous green to bronzy cupreous, the prosternal lobe is sometimes vaguely emarginate at the middle, the pubescence varying from yellowish white to golden yellow, rarely the vertical parts of the second abdominal segment are nearly glabrous, and in one female from New Haven the suture between the first and second abdominal segments is distinct for one-half the distance to the middle. Length 7.75 to 11.8 millimeters.

Host.—The larval habits are unknown, but Frost has collected the adults on red oak (*Quercus rubra* Linnaeus), which suggests that it may be the host for the larvae.

This seems to be a valid species, but it is so closely allied to *quadriimpressus* Ziegler, that it is difficult to give characters in the table for separating all of the examples of both species satisfactorily. In *auricomus* the pronotum is usually more deeply depressed on the median part toward the anterior margin, the elytra more acutely rounded at the tips, and distinctly wider at the base than at the apical third, and the vertical parts of the abdominal segments are usually densely clothed with golden yellow pubescence. The male genitalia in *auricomus* have the lateral lobes feebly but arcuately narrowed to the tips, which are acute, and the median lobe acuminate at the apex, whereas in *quadriimpressus* the lateral lobes are nearly parallel to the tips, which are not acute, and the median lobe obtusely rounded at the apex. One example collected by the writer at Lyme, Conn., is placed with this species temporarily, but it differs from *auricomus* in having the pubescence on vertical parts of abdomen white, and the color uniformly olivaceous, in which respect it resembles *olivaceoniger*, but lacks the uniformly distributed white hairs on the elytra.

41. AGRILUS QUADRIIMPRESSUS Ziegler

Agrilus quadriimpressus Ziegler, Proc. Acad. Nat. Sci. Phila., vol. 2, 1845, pp. 267–268.—Henshaw, Canad. Ent., vol. 17, 1885, p. 131.
Agrilus acutipennis Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 307–308 (part).—Chamberlin, Cat. Buprestidae, 1926, pp. 47–48 (part).

Male.—Form rather robust, feebly shining, and slightly flattened above; head green or aeneous, sometimes with a feeble cupreous reflection; pronotum and elytra varying from olivaceous to black, with a more or less distinct aeneous, greenish, or bluish tinge; beneath more shining than above.

Head with the front rather wide, nearly flat, distinctly narrower at bottom than at top, more or less deeply impressed on the occiput and vertex, lateral margins obliquely expanding from base to middle where they are arcuately rounded, and with a narrow, longitudinal groove extending from the occiput to middle of front; surface densely, coarsely punctate, more or less rugose, and sparsely clothed with moderately long, semierect, cinerous hairs; epistoma rather narrow between the antennae, and broadly, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, and about equally rounded above and beneath.

Pronotum one-half wider than long, the base and apex about equal in width, and widest near middle or apical third; sides rather strongly, arcuately rounded; when viewed from the side the marginal and submarginal carinae are strongly sinuate, narrowly separated anteriorly, and connected to each other at base; anterior margin moderately sinuate, with a broadly rounded median lobe; base rather strongly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk convex, with a broad, moderately deep depression in front of scutellum (sometimes with two small, vague depressions placed transversely on anterior part of disk), a small depression on each side along base near posterior angle, a broad, deep one along the lateral margins, and without prehumeral carinae; surface coarsely, densely, transversely rugose, finely punctate between the rugae and toward the lateral margins, without distinct pubescence, except sometimes with a few sparsely placed hairs in lateral depressions. Scutellum rather strongly, transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base, about equal in width at base and apical third; sides nearly parallel for a short distance behind base, broadly, arcuately constricted in front of middle, arcuately rounded at apical third, then obliquely attenuate to the tips, which are separately, rather broadly rounded, and strongly serrulate; sides of abdomen broadly exposed above; disk rather strongly flattened, with an obsolete longitudinal costa at middle of each elytron, sutural margins feebly elevated posteriorly, and with broad, deep basal depressions; surface densely, finely imbricate-punctate; without distinct pubescence, except for a few sparsely placed, short, recumbent, whitish hairs at apex, and a narrow obsolete row of similar hairs along the sutural margin at apical fourth.

Abdomen beneath finely and sparsely punctate along the middle, more densely toward the sides, becoming somewhat rugose at sides of basal segment, sparsely clothed with short, recumbent, whitish pubescence, and sometimes with a slightly more densely pubescent spot at the sides of the segments; first segment slightly flattened at middle, the second with a deep, smooth groove, which is not wider in front than behind, and extending from anterior margin to apical third; last segment broadly rounded at apex; vertical portions of the segments rather densely clothed with recumbent, whitish pubescence; pygidium coarsely punctate, strongly carinate, the carina projecting and truncate at apex. Prosternum coarsely punctate, sometimes rugose, and sparsely clothed with short, recumbent, whitish hairs; prosternal lobe broad, slightly declivous, and broadly rounded or subtruncate in front; prosternal process broad, surface more or less concave, and the sides parallel to behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, nearly straight, anterior and middle pairs with a distinct tooth on inner margin at apex, the posterior pair simple. Posterior tarsi distinctly shorter than tibiae, and the first joint about equal in length to the following three joints united. Tarsal claws dissimilar, anterior ones cleft near the tips, and the teeth nearly equal in length; middle and posterior claws cleft near the middle, the inner tooth shorter than the outer one, slightly turned inward, but the tips distant. Genitalia similar to those of *acutipennis* Mannerheim.

Female.—Similar to the male, but the front of head varying in color from green to cupreous, wider, sides more parallel and feebly expanded at middle, and about equal in width at bottom and top; antennae slightly shorter; eyes narrower; abdomen beneath more finely, sparsely punctate, without distinct pubescent spots at sides, and the second segment not grooved at the middle; tooth at apex of anterior and middle tibiae less distinct, and the claws alike on all the feet, similar to those on the posterior feet of the male.

Length, 7.5–10.5 mm.; width, 2–2.75 mm.

Redescribed from specimens reared from oak (*Quercus* sp.) collected at French Creek, W. Va., by F. E. Brooks. These specimens agree very well with the description given by Ziegler, and seem to be distinct enough to retain as a valid species.

Type locality.—Georgia. Described from the Haldeman collection, but present location of type is unknown to the writer.

DISTRIBUTION

Material examined:

CONNECTICUT: Lyme, May 24, on *Ostrya virginiana* (W. S. Fisher). Wallingford, June 24, (D. J. Caffrey).
DISTRICT OF COLUMBIA: Washington, June 15 (H. G. Hubbard).
KENTUCKY: Louisville, June 3 (H. Soltau).
MASSACHUSETTS: Framingham, May, June, sweeping red oak (C. A. Frost). Tyngsboro (Blanchard).
MICHIGAN: Detroit (Hubbard and Schwarz).
NEW YORK: Olcott, July 11 (H. Dietrich). West Point, June 14 (W. Robinson).
OKLAHOMA: Wichita National Forest, June 5 (W. J. Brown).
TENNESSEE: Clarksville, June 18 (W. D. Pierce).
VIRGINIA: Mount Vernon, June 9 (W. L. McAtee).
WEST VIRGINIA: French Creek (F. E. Brooks).

Variations.—The color and depressions on the pronotum are more or less variable in this species, and the tips of the elytra are usually broadly rounded, but a few examples were examined in which the tips were subacute.

Host.—This species has been reared from oak (*Quercus* sp.)

This species is very closely allied to *acutipennis* Mannerheim, and there will be some difficulty in separating some specimens from that species. In *acutipennis* the elytra are usually blue, with an occasional black specimen, and in all of the examples examined, the vertical portions of the second abdominal segment are entirely glabrous, whereas in *quadriimpressus* the elytra are more olivaceous black, and the vertical portions of the second abdominal segment are pubescent, although in some examples the portions are very sparsely clothed.

42. AGRILUS AUROGUTTATUS Schaeffer

Agrilus auroguttatus SCHAEFFER, Bull. Brooklyn Inst. Mus., vol. 1, no. 7, 1905, pp. 149–150.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 208.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 53.

Female.—Form rather robust, subcylindrical, and strongly flattened above; head and pronotum feebly shining, aeneous, the latter slightly darker than head; elytra black, with a feeble purplish reflection, opaque, and each elytron with three distinct golden yellow pubescent spots; beneath aeneous, and more shining than above.

Head with the front rather wide, nearly flat, about equal in width at top and bottom, without distinct depressions, lateral margins feebly arcuately expanded at middle, and with a feeble, longitudinal groove extending from occiput to middle of front; surface coarsely, densely punctate, somewhat transversely rugose on the front, becoming longitudinally rugose on the occiput, and sparsely clothed with moderately long, semierect, cinereous hairs; epistoma wide between the antennae, and rather broadly, deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, and about equally rounded beneath and above.

Pronotum nearly one-third wider than long, wider at apex than base, and widest near middle; sides feebly, arcuately rounded from apical angles to basal third, then strongly narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina nearly straight, the two carinae widely separated at apical fourth, and narrowly separated to the base; anterior margin rather strongly sinuate, with the median lobe broadly rounded; base rather deeply emarginate at middle of each elytron, the median lobe broadly rounded and truncate in front of scutellum; disk moderately convex, with two broad median depressions, feebly separated at middle, a broad, deep depression on each side along the lateral margin, and with strongly elevated prehumeral carinae extending from base near posterior angles to basal third; surface densely, deeply, transversely rugose, finely punctate between the rugae, rather densely clothed with fine, erect, inconspicuous hairs, and the lateral depressions densely clothed with long, recumbent, golden yellow pubescence. Scutellum strongly, transversely carinate, and the surface finely reticulate.

Elytra about equal in width to the pronotum at base, and slightly wider at base than just behind the middle; sides nearly parallel for a short distance behind base, feebly, broadly, arcuately constricted in front of middle, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and coarsely serrulate; sides of abdomen broadly exposed above; disk feebly flattened; the junction of the discal flattened portion with the convex sides of the elytra has the appearance of an obtuse costa, the sutural margins elevated near apex, and with broad, deep basal depressions; surface finely, densely imbricate-punctate, sparsely clothed with fine, inconspicuous hairs, and each elytron ornamented with three distinct spots of densely placed, recumbent, golden yellow pubescence, one in basal depression, one just in front of middle, the other near apical third, and with a few short, cinerous hairs along sutural margin at apex.

Abdomen beneath finely, sparsely punctate at middle, more densely toward the sides, and somewhat transversely rugose on basal segment, sparsely clothed with short, semierect, cinereous hairs, and with a spot of longer, more densely placed golden yellow pubescence at the sides of the third and fourth segments; first segment vaguely flattened at middle, and the second without a median groove; last segment subtruncate at apex; vertical portions of the segments densely clothed with long, recumbent, golden yellow pubescence, except the second, which is glabrous; pygidium strongly carinate, the carina projecting and truncate at apex. Prosternum sparsely, coarsely punctate, more or less rugose, and sparsely clothed with short, semierect, cinereous hairs; prosternal lobe broad, moderately declivous, and broadly subtruncate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then rounded to the apex, which is acute. Tibiae slender, straight, and without a distinct tooth at apex. Posterior tarsi nearly as long as the tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth slender, shorter than outer one, and turned inward, but the tips distant.

Length, 11.5 mm.; width, 3 mm.

Male.—Differs from the female in being more slender, front of head bronzy green, slightly more pubescent, narrower, and the lateral margins more strongly, arcuately expanded at vertex; eyes more broadly elongate, and slightly more broadly rounded beneath than above; prosternum sparsely clothed with moderately long, semierect, white hairs, and the prosternal lobe more broadly rounded in front; first abdominal segment feebly, broadly concave at middle, and the second with a rather broad, deep, smooth depression extending from anterior margin to middle of segment; anterior and middle tibiae armed with a short tooth on inner margin at apex; tarsal claws dissimilar, anterior and middle claws cleft near tip, about equal in length, and not turned inward, posterior claws cleft near the middle, the inner tooth shorter than outer one, and turned inward, but the tips distant. Genitalia not examined.

Length, 8.5 mm.; width, 2 mm.

Redescribed from the female and male cotypes No. 237, in the collection of the Brooklyn Institute of Arts and Sciences.

Type locality.—Palmerlee, Huachuca Mountains, Arizona.

Distribution.—Arizona: Type locality, August 15, and Rams Canyon, Huachuca Mountains August 4 (Chas. Schaeffer). Santa Rita Mountains, July 26 (W. J. Chamberlin).

Variations.—None worthy of note has been observed in the few specimens examined.

Host.—The larval habits are unknown, but the adults have been taken by beating the branches of black oak (*Quercus* sp.)

This species can be easily separated from all other known North American species having the antennae serrate from the fourth joint, the claws not incurved, and the pygidium with a projecting carina, by the six very distinct golden yellow pubescent spots on the elytra.

43. AGRILUS GRANULATUS (Say)

Buprestis granulata Say, Journ. Acad. Nat. Sci. Phila., vol. 3, 1823, p. 162.

Buprestis (*Teres*) *granulata* (Say) Harris, New England Farmer, vol. 8, ser. 1, 1829, pp. 2–3.

Agrilus granulatus Say, Trans. Amer. Philos. Soc., vol. 6, new ser., 1836, p. 162.—LeConte, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 245; Say's Writings, vol. 2, pp. 104, 596, (Baillière Bros. ed., 1859; Cassino and Co. ed., 1883).—Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 93.—Burrill, 12th Rept. State Ent. Illinois, 1883, pp. 121–122.—Blanchard, Ent. Amer., vol. 5, 1889, p. 32 (probably *quadriguttatus*).—Cook, 29th Rept. Mich. Board Agric., 1890, p. 119.—Packard, 5th Rept. U. S. Ent. Comm., 1890, pp. 443–444.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 302–303 (part).—Hamilton, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364.—Evans, Canad. Ent., vol. 27, 1895, p. 146.—Wickham, Proc. Davenport Acad. Nat. Sci., vol. 6 (author's edition), 1896, p. 152.—Harris, Psyche, vol. 8, 1899, p. 411.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, pp. 67–68 (part).—Smith, 27th Rept. N. J. State Board Agric. for 1899, (1900), suppl. p. 257 (probably *quadriguttatus*).—Ulke, Proc. U. S. Nat. Mus., vol. 25, no. 1275, 1902, p. 47 (probably *quadriguttatus*).—Felt, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 746.—Gibson, 38th Rept. Ent. Soc. Ontario for 1907 (1908), p. 126.—Smith, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295 (probably *quadriguttatus*).—Blatchley, Coleoptera of Indiana, 1910, p. 801.—Manee, Ent. News, vol. 24, 1913, p. 171 (probably *quadriguttatus*).—Burke, Journ. Econ. Ent., vol. 10, 1917, p. 331 (part).—Frost and Weiss, Canad. Ent., vol. 52, 1920, pp. 208, 247 (part).—Knull, Canad. Ent., vol. 54, 1922, p. 86 (part).—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection. Circ. 48, 1922, pp. 8–9 (part).—Knull, Ohio State. Univ. Studies, vol. 2, no. 2, 1925, pp. 44–45 (part).—Essig, Ins. Western North Amer., 1926, p. 403.—Chamberlin, Cat. Buprestidae, 1926, p. 64 (part).

Female.—Form resembling *anxius*, moderately shining, and feebly flattened above; olivaceous brown, with the head and pronotum more or less cupreous; beneath cupreous, and more shining than above.

Head with the front rather wide, nearly flat, slightly wider at bottom than at top, without distinct depressions, lateral margins nearly parallel, feebly, arcuately expanded at middle, and with a feeble, longitudinal groove extending from the occiput to middle of front; surface coarsely, densely punctate, the punctures more or less confluent, somewhat rugose on the occiput, and densely clothed with long, recumbent, whitish pubescence, more golden colored anteriorly, and nearly concealing the surface; epistoma very wide between the antennae, and deeply, very broadly, arcuately emarginate in front; antennae missing; eyes large, and about equally rounded beneath and above.

Pronotum one-half wider than long, base and apex about equal in width, and widest near middle; sides feebly, arcuately rounded from apical angles to basal third, then strongly narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal carina is very strongly sinuate, the submarginal carina feebly sinuate, the two carinae rather widely separated anteriorly, and connected to each other at the base; anterior margin rather strongly sinuate, with the median lobe broadly rounded; base feebly emarginate at middle of each elytron, the median lobe very broadly rounded, and subtruncate or feebly emarginate in front of scutellum; disk moderately convex, with a broad, shallow, median depression, feebly divided at middle, and the posterior part slightly more deeply depressed, on each side a broad, deep depression extending along lateral margin from near the apical angles to middle, then obliquely to the base on inner side of prehumeral carina, which is sharply defined, feebly arcuate, and extending from posterior angle to near the middle; surface densely, coarsely, but not deeply, transversely rugose, finely punctate between the rugae, sparsely clothed with short, recumbent, whitish hairs, and more densely clothed with longer, golden pubescence in the lateral depressions. Scutellum strongly, transversely carinate, and the surface feebly reticulate.

Elytra slightly wider than pronotum at base, and distinctly wider at base than at apical third; sides nearly parallel for a short distance behind base, scarcely constricted in front of middle, feebly, arcuately expanded at apical third, then broadly, obliquely attenuate to the tips, which are separately, rather broadly rounded, and finely serrulate; sides of abdomen broadly exposed above; disk rather strongly flattened, the junction of the discal flattened portion with the convex sides of the elytra has the appearance of an obtuse costa, the sutural margins rather strongly elevated toward the apex, and with broad, deep, basal depressions; surface coarsely, densely imbricate-punctate, sparsely clothed with regularly placed short, recumbent, cinereous hairs, and each elytron ornamented with three spots of more densely placed, longer, golden hairs, one in basal depression, one in front of middle, and the other near the apical fourth.

Abdomen beneath finely, sparsely punctate along the middle, more densely toward the sides, becoming transversely rugose on basal segment, sparsely clothed with short, recumbent cinereous hairs, and with a spot of longer, more densely placed, golden pubescence at the sides of the segments; first segment convex at middle, and the second without a median groove; last segment broadly rounded at apex; vertical portions of the segments densely clothed with long, recumbent, golden pubescence, except the second, which is glabrous; pygidium strongly carinate, the carina projecting and truncate at apex. Prosternum sparsely, coarsely punctate, coarsely granulose, and densely clothed with short, recumbent, cinereous pubescence; prosternal lobe broad, moderately declivous, and broadly rounded in front, with a rather deep, broadly arcuate emargination at the middle; prosternal process broad, the sides parallel to behind the coxal cavities, then strongly narrowed to the apex, which is acute. Tibiae slender, straight, and without a distinct tooth at apex. Posterior tarsi distinctly shorter than the tibiae, and the first joint about as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth short and not turned inward.

Length, 10 mm.; width, 2.5 mm.

Male.—Differs from the female in being slightly more slender, front of head narrower, with the lateral margins more strongly expanded near the middle; first abdominal segment broadly, longitudinally concave at the middle, and the second with a rather wide, deep, smooth depression extending from the anterior margin of segment to the apical third; prosternum more finely punctured and more densely pubescent; anterior and middle tibiae armed with a short tooth on inner margin at apex, and the tarsal claws dissimilar; the anterior pair cleft near the tip and the teeth nearly equal in length; posterior pair cleft near the middle, the inner tooth shorter than outer one, and feebly turned inward, but the tips distant; middle claws dissimilar, the one claw cleft near the tip, with the teeth nearly equal in length, and the opposite claw cleft near middle, with the inner tooth shorter than outer one. Genitalia similar to those of *quadriguttatus* Gory.

Redescribed from a female specimen in the United States National Museum collection from Riley County, Kans., collected on June 4 by P. J. Parrott. Since the type of this species is lost, I am designating this specimen as the neotype.

Type locality.—Missouri.

DISTRIBUTION

Material examined:

Colorado: Colorado Springs, reared (B. T. Harvey); June (H. F. Wickham), Denver, June 1897 (H. F. Wickham).

Illinois: No definite locality.

Kansas: Salina (Jones). Riley County, June 4 (P. J. Parrott).

Montana: Crow Agency, July, 1916 (R. Kellogg).

New York: Nassau, June 29 (——).

It is recorded from Canada, District of Columbia, Indiana, Massachusetts, Maryland, Missouri, New Jersey, North Carolina, Pennsylvania, Wisconsin, and Wyoming, but some of these records refer to *quadriguttatus* Gory.

Variations.—In the series of specimens examined the length varied from 7 to 11 mm., and the pubescence from whitish yellow to golden yellow. The greatest variation was found in the depressions on the pronotum. In some examples the median depression was moderately deep and divided into two parts, whereas in others the anterior depression was obsolete, but with a small round depression on each side of the median line, and about halfway between the middle and anterior margin. The antennae extend slightly beyond middle of pronotum, serrate from the fourth joint, and the outer joints are about as wide as long.

Hosts.—This species has been reared from Lombardy poplar (*Populus nigra* var. *italica* Du Roi), and cottonwood (*Populus deltoides* Marshall). It has also been recorded in the literature from *Populus trichocarpa* Hooker, but so far no adults have been recorded from the region where this species of *Populus* is found. It is known as the "Lombardy poplar borer" and is recorded as girdling and killing limbs and entire poplar and cottonwood trees.

Many of the records in the literature under this species, at least in part, refer to *quadriguttatus* Gory. *Agrilus aleus* described by Gory from Columbia [3] has been placed as a synonym of this species. It does not belong to our fauna, and the characters given in the description do not agree with the above species, so it should be dropped from our catalogues as a synonym of *granulatus* Say. Crotch [4] writes that *biguttatus* Gory is evidently identical with *granulatus* Say, but this is probably an error, as *biguttatus* is a common European species, and is certainly distinct from the American *granulatus*.

One male specimen collected by the writer at Harrisburg, Pa., June 25, 1907, has the elytra bluish black, with a distinct greenish and purplish tinge, the surface is nearly glabrous except for the pubescent spots, which are distinct, and a few scattered hairs along the sutural margins near the apex, but otherwise it is typical of the species.

44. AGRILUS QUADRIGUTTATUS Gory

Figure 31

Agrilus quadriguttatus Dejean, Cat. Coleopt.. ed. 2, 1833, p. 82; ed. 3, 1837, p. 93 (no description).—Gory, Mon. Bupr., Suppl., vol. 4, 1841, p. 228, pl. 38, fig. 219.—LeConte, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9; Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 245.—Kerremans, Mem. Soc. Ent. Belg., no. 1. 1892, pp. 270, 278.

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[3] Mon. Bupr. Suppl., vol. 4, 1841, p. 250, pl. 41, fig. 242.

[4] Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 93.

Agrilus granulatus BLANCHARD, Ent. Amer., vol. 5, 1889, p. 32 (?).—HORN Trans. Amer. Ent. Soc., vol 18, 1891, pp. 302–303 (part).—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, pp. 67–68 (part).—SMITH, 27th Rept. N. J. State Board Agric. for 1899 (1900), suppl., p. 257 (?).—ULKE, Proc. U. S. Nat. Mus., vol. 25, no. 1275, 1902, p. 47 (?).—SMITH, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295 (?).—MANEE, Ent. News, vol. 24, 1913, p. 171 (?).—BURKE, Journ. Econ. Ent., vol. 10, 1917, p. 331 (part).—FROST and WEISS, Canad. Ent., vol. 52, 1920, pp. 208, 247 (part).—KNULL, Canad. Ent., vol. 54, 1922, p. 86 (part).—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, pp. 8–9 (part).—KNULL, Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 44–45 (part).—CHAMBERLIN, Cat. Buprestidae, 1926, p. 64 (part).

Male.—Form rather slender, subcylindrical, moderately shining, and feebly flattened above, color varying from olive green, with a more or less cupreous reflection, to a dark brown, with a distinct cupreous tinge; beneath cupreous brown to dark bronzy green, and more shining than above.

Head with the front rather wide, nearly flat, about equal in width at top and bottom, without distinct depressions, lateral margins feebly, arcuately expanded at middle, and with a narrow, longitudinal groove extending from occiput to middle of front; surface densely, coarsely punctate, the punctures more or less confluent, sometimes becoming rugose on occiput and in front of epistoma, and sparsely clothed with moderately long, semierect, cinerous hairs; epistoma wide between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending beyond middle of pronotum, serrate from the fourth joint, and the outer joints feebly longer than wide; eyes large, and about equally rounded above and beneath.

Pronotum not quite one-half wider than long, base and apex about equal in width and widest at middle; sides rather strongly arcuately rounded; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina feebly sinuate, the two carinae not very widely separated anteriorly, and connected to each other at the base; anterior margin rather strongly sinuate, with a broadly rounded median lobe; base slightly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, depressions variable, and with a distinct, arcuate prehumeral carina extending from base near posterior angles to basal third; surface densely, coarsely, transversely rugose, finely punctate between the rugae, and sparsely clothed with short, inconspicuous hairs. Scutellum transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base and about equal in width at base and apical third; sides nearly parallel for a short distance behind the base, slightly, broadly, arcuately constricted in front of middle, broadly, arcuately expanded at apical third, then obliquely attenuate to the tips, which are separately, acutely rounded and strongly serrulate; sides of abdomen broadly exposed above; disk feebly flattened, the junction of the discal flattened area with the convex sides of the elytra has the appearance of an obsolete carina, the sutural margins rather strongly elevated behind the middle, and with broad, deep, basal depressions; surface coarsely, densely imbricate-punctate, sparsely clothed with regularly placed short, inconspicuous hairs, and each elytron ornamented with three indistinct pubescent spots—basal, median, and preapical—the first two frequently missing.

Abdomen beneath sparsely, finely punctate at the middle, more densely toward the sides, more or less transversely rugose on basal segment, sparsely clothed with short, recumbent, cinereous hairs, and with a spot of longer, densely placed, whitish pubescence at the sides of the segments; first segment broadly concave at middle, the second with a rather wide, deep, smooth groove, which has the sides nearly parallel, and extending from the anterior margin of segment to apical third; last segment subtruncate at apex; vertical portions of the segments densely clothed with long, recumbent, whitish pubescence, except the second, which is glabrous; pygidium strongly carinate, the carina projecting and truncate at apex. Prosternum densely, coarsely punctate, rather densely clothed with moderately long, semierect, cinereous hairs; prosternal lobe broad, moderately declivous, and broadly rounded in front, with a broad, shallow emargination at the middle; prosternal process broad, parallel to behind the coxal cavities, then obliquely attenuate to the apex, which is acute. Tibiae slender, straight, anterior and middle pairs with a short tooth on the inner margin at apex, and the posterior pair simple. Posterior tarsi slightly shorter than the tibiae, and the first joint nearly as long as the following three joints united. Tarsal claws dissimilar, anterior and middle pairs cleft near the tip, and the teeth nearly equal in length; posterior claws cleft near the middle, the inner tooth slightly shorter than the outer one, feebly turned inward, but the tips distant.

Female.—Differs from the male in being more robust, front of head broader, sides more parallel, slightly wider at bottom than at top, and of a more cupreous color; pronotum one-half wider than long; abdomen more sparsely punctate, the first segment convex at middle, and the second without a median groove; prosternum more sparsely punctured, and the lobe more deeply emarginate at middle; tibiae not mucronate at apex, and the tarsal claws similar on all feet, cleft near the middle, the inner tooth short, and not turned inward.

Length, 6.5–9.25 mm.; width, 1.5–2.5 mm.

Type locality.—North America. Present location of type unknown to the writer.

DISTRIBUTION

Material examined:

COLORADO: Ivywild, reared (B. T. Harvey).

DISTRICT OF COLUMBIA: Washington, June 3 (W. Middleton); June 16 (Hubbard and Schwarz).

IOWA: Ames, June 27 (L. S. Wells).

KANSAS: Cowley, Cheyenne, Cherokee, and Rawlins Counties (R. H. Beamer). Douglas County (F. H. Snow). Onega (W. Knaus).

MARYLAND: Beltsville, June 4 (W. L. McAtee). Plummer Island, June–July (taken by all collectors).

NORTH CAROLINA: No definite locality.

PENNSYLVANIA: Allegheny County (Ehrmann). Harrisburg (Champlain and Knull).

SOUTH DAKOTA: Lennox, July 15 (L. L. Gardner).

TEXAS: No definite locality.

VIRGINIA: Stone Creek, Lee County (Hubbard and Schwarz).

Variations.—The species is quite variable in color, varying from olive green to brownish cupreous. The depressions on the pronotum are also variable; in some examples there is a broad, deep, median depression, which is feebly interrupted at the middle, and the lateral depressions deep, and extending from near the apical angles to the base on inner side of the prehumeral carinae, whereas in other examples the lateral depressions are shallow, and the median depression is only more or less indicated in front of the scutellum, and sometimes with a small round depression on each side of the middle near the anterior margin. The pubescent spots on the elytra are usually only feebly indicated, and frequently the two anterior ones are entirely wanting.

Hosts.—Reared from the sapwood of dead willow (*Salix* sp.) collected at Harrisburg, Pa., by A. B. Champlain and J. N. Knull, and also from the same host in Colorado, by B. T. Harvey. This is probably the species recorded as having been collected on partly dead alders (*Alnus* sp.). although no specimens have been examined which were collected on that plant.

This species is very closely allied to *granulatus* Say, and is confused with that species in most collections, but from recent studies and a knowledge of the habits of both species, it seems to be a valid species as considered by LeConte. It differs from *granulatus* in having the front of the head more convex, and the pubescence not obscuring the surface; pronotum with the lateral margins more regularly rounded, and not strongly sinuate near the base, the median depression usually more obsolete, especially the anterior part, the lateral depressions scarcely pubescent, and the transverse rugae deeper; elytra more gradually narrowed posteriorly, the tips more acutely rounded and more coarsely serrulate, and the pubescent spots less distinct.

Horn (1891, p. 303) writes that "LeConte (1859) admits both *granulatus* and *quadriguttatus*, but it is very clear that he has used the female as his type of the former and a male for the latter." This statement is incorrect , as there are only four examples in the LeConte collection under *granulatus* (including *quadriguttatus*), all of which are females.

45. AGRILUS NIVEIVENTRIS Horn

Figure 32

Agrilus niveiventris Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 304–305; Proc. Calif. Acad. Sci., vol. 4, ser. 2, 1894, p. 328.—Fall, Ent. News, vol. 5, 1894, p. 98.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 4, no. 3, 1898, p. 305.—Fall, Calif, Acad. Sci., Occasional Papers, no. 8, 1901, pp. 23, 120.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 5, no. 3, 1902, p. 269 (probably *politus*).—Fall, Ent. News, vol. 17, 1906, p. 168.—Woodworth, Guide to Calif. Ins., 1913, p. 194.—Burke, Journ. Econ.' Ent., vol. 10, 1917, p. 331 (part).—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 247 (part).—Chamberlin, Journ. N. Y. Ent. Soc., vol. 32, for 1924 (1925) p. 193 (this is *populi*).—Essig, Ins. Western North Amer., 1926, p. 403 (part).—Chamberlin, Cat. Buprestidae. 1926, p. 71 (part).

Female.—Form moderately robust, feebly shining or subopaque, and slightly flattened above; head bronzy brown; pronotum aeneous, with a greenish tinge; elytra bronzy brown, with a feeble reddish cupreous tinge; beneath bronzy brown. with a more or less cupreous reflection, and densely efflorescent.

Head with the front moderately wide, feebly convex, slightly wider at bottom than at top, without distinct depressions, lateral margins arcuately expanded at middle, and with a feeble, narrow groove extending from occiput to middle of front; surface coarsely, densely punctate, feebly rugose, and rather densely clothed with long, recumbent, whitish pubescence on lower half; epistoma strongly transverse between the antennae, and very broadly, deeply, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fourth joint, and the outer joints slightly longer than wide; eyes large, elongate, and about equally rounded above and beneath.

Pronotum about one-half wider than long, base and apex about equal in width, and widest at middle; sides rather strongly, arcuately rounded from apical angles to near base, where they are nearly parallel to each other, and the posterior angles rectangular; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina feebly sinuate, the two carinae widely separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate; with a broadly rounded median lobe; base feebly emarginate at middle of each elytron, the median lobe broadly rounded, and truncate in front of scutellum; disk moderately convex, with a broad, vague, median depression composed of an anterior and posterior part, a broad, moderately deep depression on each side along lateral margins, and with sharply defined, arcuate prehumeral carinae extending from posterior angles to near middle; surface densely but not deeply transversely rugose, finely, densely granulose, finely punctate between the rugae, and sparsely clothed with very short, recumbent, whitish hairs, with a few longer ones in the lateral depressions. Scutellum strongly, transversely carinate, and the surface finely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted in front of middle, arcuately expanded behind middle, then obliquely attenuate to the tips, which are separately, rather acutely rounded and strongly serrulate; sides of abdomen narrowly exposed above; disk feebly flattened at middle, forming a vague costa toward the sides, sutural margins strongly elevated posteriorly, and with broad, deep basal depressions; surface finely imbricate-punctate, and ornamented with three indistinct, cinereous pubescent spots arranged as follows: One basal, one in front of middle merely represented by a slightly denser punctured area, and a more elongate one at apical third, extending along margin to near apex.

Abdomen beneath finely, sparsely punctate at middle, more densely toward the sides, becoming transversely rugose on the basal segment, and densely clothed toward the sides with long, recumbent, whitish hairs and efflorescence, with a few shorter hairs of the same color on the median parts; first and second segments convex, and without a median groove; last segment broadly rounded at apex; vertical portions of segments rather densely but not conspicuously, clothed with short, whitish pubescence; pygidium strongly carinate, the carinae projecting, and truncate at apex. Prosternum densely, coarsely punctate, and rather densely clothed with long, recumbent, whitish hairs; prosternal lobe broad, strongly declivous, and broadly, arcuately rounded in front; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then strongly narrowed to the apex, which is acute. Tibiae slender, straight, and the anterior pair with an indistinct tooth on inner margin at apex. Posterior tarsi shorter than tibiae, and the first joint about as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, and the inner tooth shorter than the outer one.

Length, 9.5 mm.; width, 2.5 mm.

Male.—Usually more slender than female, front of head slightly flatter, narrower, bronzy green, becoming brownish cupreous on occiput, about equal in width at top and bottom, lateral margins more arcuately expanded at middle, and the surface vaguely granulose; eyes more broadly elongate; first abdominal segment feebly flattened at middle, and the second with a broad, feebly depressed, smooth groove on anterior half; last segment broadly subtruncate at apex; tibiae with a small tooth on inner margin at apex, those on posterior pair often indistinct; posterior tarsi slightly shorter than tibiae, and the first joint about equal in length to the following three joints united; tarsal claws on anterior and middle feet cleft one-third from tip, and the teeth nearly equal in length, those on the posterior feet cleft near middle, the inner tooth shorter than outer one, feebly turned inward, but the tips distant.

Redescribed from the female lectotype No. 3480 in the Academy of Natural Sciences of Philadelphia.

Type locality.—Los Angeles, Calif.

DISTRIBUTION

Material examined:

ARIZONA: Near Yuma (——).
CALIFORNIA: Los Angeles County (Coquillett).
  Ventura County, May 31 (A. D. Hopkins).
  Colton, April 22, 1879 (Riley collection).
  Gilroy (L. S. Slevin).
  Pomona (Stromberg collection).
NEVADA: No definite locality.
UTAH: Bellevue, June, and Zion Canyon, June (W. Knaus).

Variations.—This species is rather uniform in color, but some examples are slightly more shining and have a slightly more purplish tinge on the elytra. The pubescent spots on the elytra are indistinct, in most cases only the preapical spot is present, and frequently there are a few hairs extending along the sutural margin near the apex. In carefully collected specimens the sides of the pronotum have a white efflorescence, and the sides of the body beneath seem very densely pubescent due to this efflorescence between the hairs. This is, however, so easily lost, that in most examples it is missing. The tooth on the tibiae is quite variable in length, sometimes it is quite distinct, and again scarcely noticeable, and sometimes it is feebly indicated on the anterior tibiae of the females. In most cases the prosternal lobe is broadly rounded in front, but occasionally a specimen is found in which it is feebly, arcuately emarginate. Length 6.5 to 10 millimeters.

Hosts.—Reared from dead Western Black Willow (*Salix lasiandra* Bentham) in California by A. D. Hopkins. The adults were found feeding also on White Willow (*Salix lasiolepis* Bentham) in which the larvae probably also live.

This species is closely allied to *fulminans* and *populi*, and all three species are confused in collections under *niveiventris*, however, *niveiventris* is a more opaque species.

46. AGRILUS FULMINANS, new species

Figure 33

Male.—Form resembling that of *niveiventris* Horn, strongly shining, and scarcely flattened above; head and pronotum bronzy green, the former usually more greenish; elytra varying from green through olivaceous to a bright cupreous, with a more or less distinct purplish tinge; beneath bronzy green.

Head with the front rather narrow, slightly convex, about equal in width at bottom and top, the lateral margins arcuately expanded at middle, and with a narrow, longitudinal groove extending from the occiput to middle of front; surface coarsely, densely punctate, more sparsely on occiput, and sparsely clothed with moderately long, semierect, whitish hairs; epistoma slightly transverse between the antennae, and broadly, deeply arcuately emarginate in front; antennae extending slightly beyond middle of pronotum, serrate from the fourth joint, and outer joints about as wide as long; eyes large, elongate, and equally rounded above and beneath.

Pronotum nearly one-half wider than long, vaguely narrower at base than apex, and widest at middle or along apical half; sides vaguely, arcuately rounded or nearly parallel from apical angles to behind middle, then strongly narrowed to posterior angles; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina feebly sinuate, the two carinae rather widely separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, and the median lobe broadly, arcuately rounded; base feebly, broadly emarginate at middle of each elytron, the median lobe feebly rounded, and subtruncate in front of scutellum; disk moderately convex, with a broad, shallow depression in front of scutellum, a small, round depression on each side of middle at apical third, a broad, moderately deep depression on each side along lateral margin, and with sharply defined, arcuate prehumeral carinae; surface densely granulose, densely but not deeply, transversely rugose, sparsely punctate between the rugae, and sparsely clothed with very short, inconspicuous hairs. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, very broadly, feebly constricted in front of middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and strongly serrulate; sides of abdomen rather narrowly exposed above; disk feebly flattened, forming a vague longitudinal costa on each elytron, sutural margin slightly elevated posteriorly, and with broad, deep, basal depressions; surface coarsely, but not deeply imbricate-punctate, vaguely rugose, clothed with a few short, scattered, white hairs toward apex, and ornamented with pubescent spots as in *niveiventris*, but usually only the one at apical third distinct.

Abdomen beneath finely, densely punctate at middle, more densely toward the sides, becoming rugose or imbricate on basal segment, sparsely clothed with short, recumbent, whitish hairs, and each segment ornamented with a more densely pubescent spot at the sides, which is usually more or less covered with white efflorescence; first segment flattened at middle; second segment with a vaguely depressed smooth space at anterior half of middle; last segment broadly subtruncate at apex; vertical portions of segments not conspicuously pubescent; pygidium coarsely punctate, strongly carinate, the carina strongly projecting and truncate at apex. Prosternum densely, coarsely punctate, and rather densely clothed with moderately long, semierect, whitish hairs; prosternal lobe broad, moderately declivous, and broadly rounded or subtruncate in front; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then strongly narrowed to the apex, which is acute. Tibiae slender, straight, and the anterior and middle pairs armed with a very short tooth on inner margin at apex. Posterior tarsi not quite as long as tibiae, and the first joint as long as the following three joints united. Tarsal claws nearly similar, anterior pair cleft one-third from tip, and the teeth nearly equal in length; middle and anterior claws cleft near middle, the inner tooth slightly shorter than outer one, feebly turned inward, but the tips distant.

Female.—Differs from the male in having front of head uniformly cupreous, slightly wider, and the lateral margins more parallel; eyes slightly narrower; second abdominal segment without a smooth depression at middle; last abdominal segment more broadly rounded at apex; anterior tibiae sometimes with a vague tooth at apex, and the tarsal claws similar, cleft near middle, the inner tooth shorter than outer one, and feebly turned inward.

Length, 5.5–7 mm.; width, 1.25–1.75 mm.

Type locality.—Placerville, Calif.

Other localities.—California: Los Gatos (Hubbard and Schwarz); on coast live oak (*Quercus agrifolia* Née) (H. E. Burke). Biggs, on *Salix* sp. July (A. Fényes). Chiquito Creek, Madera County, July 12 (H. Dietrich). Bair's Ranch, Redwood Creek, Humboldt County, June 9 (H. S. Barber).

Type, allotype, and paratypes.—Cat. No. 40996, U.S.N.M.

Described from a large series of specimens (one type) collected at the type locality on the Western Black Willow (*Salix lasiandra* Bentham) by H. E. Burke and Eleanor T. Armstrong.

This species is rather uniform in size, but there is considerable variation in the coloration as stated above. The prosternal lobe is usually broadly rounded in front, but in a few of the specimens examined it was broadly, arcuately emarginate. The specimens from Biggs have the elytra dark green and the pronotum more bronzy green, and two specimens from Castle Crag, received from Doctor Fényes, which I have placed under this species, have the pronotum greenish blue and the elytra a beautiful violaceous blue; otherwise there are no differences.

It is very closely allied to *niveiventris* Horn, but is more uniform in size, more shining above, and the pubescence forming spots on the sides of the abdomen, these spots in freshly collected specimens are densely covered with a white efflorescence which is easily rubbed off. It is also allied to *populi* Fisher, but that species is usually larger, the males have the first abdominal segment feebly concave, and the second segment with a broad, deep, smooth depression at the middle, and the larvae live in poplar and cottonwood.

47. AGRILUS POPULI, new species

Figure 34

Agrilus niveiventris Burke (not Horn), Journ. Econ. Ent., vol. 10, 1917, p. 331 (part).—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 247 (part).—Chamberlin, Journ. N. Y. Ent. Soc., vol. 32, for 1924 (1925), p. 193; Cat. Buprestidae, 1926, p. 71 (part).—Essig, Ins. Western North Amer., 1926, p. 403 (part).

Male.—Form resembling that of *niveiventris* Horn, strongly shining, and feebly flattened above; head green, becoming slightly cupreous on the occiput; pronotum bronzy green, and sometimes with a brownish cupreous tinge; elytra varying from golden green to reddish cupreous, and sometimes with a distinct violaceous tinge; beneath bronzy green.

Head with the front rather narrow, feebly convex, about equal in width at bottom and top, the lateral margins strongly, arcuately expanded at middle, and with a vague longitudinal groove extending from occiput to middle of front; surface coarsely, confluently punctate, more or less rugose, and rather densely clothed with long, recumbent, whitish pubescence; epistoma transverse between the antennae, and broadly, rather deeply, arcuately emarginate in front;

antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes large, elongate, and slightly more broadly rounded beneath than above.

Pronotum one-half wider than long, about equal in width at base and apex, and widest near middle; sides arcuately rounded from apical angles to base, slightly more strongly posteriorly; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina feebly sinuate or nearly straight, the two carinae widely separated anteriorly, and connected to each other behind middle; anterior margin strongly sinuate, the median lobe rather strongly, broadly rounded; base rather acutely emarginate at middle of each elytron, the median lobe broadly rounded, and truncate in front of scutellum; disk moderately convex, with two more or less distinct median depressions, the posterior one broader and deeper, a small vague depression on each side of middle at apical third, a broad, moderately deep depression on each side along lateral margin, and with sharply defined, arcuate, prehumeral carinae; surface obsoletely granulose, densely, deeply, transversely rugose, finely, sparsely punctate between the rugae, and clothed with a few short, inconspicuous hairs. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra wider than pronotum at base, and slightly wider at base than behind the middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted in front of middle, feebly, broadly expanded behind middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and strongly serrulate; abdomen rather broadly exposed above; disk feebly flattened, sometimes with a vague longitudinal costa on each elytron, and with broad, moderately deep basal depressions; surface coarsely but not deeply imbricate-punctate, more or less rugose anteriorly, and each elytron ornamented with three small pubescent spots, one in basal depression, one in front of middle, and the other at apical third.

Abdomen beneath finely, densely granulose, rather densely, finely punctate at middle, more densely toward the sides, becoming rugose on the basal segment, and sparsely clothed with short, recumbent, whitish hairs, which are more densely placed toward the sides; first segment flattened or feebly concave at middle; second segment with a rather broad, moderately deep, smooth depression at middle. the depression extending from anterior margin to apical third, and deeper anteriorly; last segment broadly truncate at apex; vertical portions of segments densely but not conspicuously pubescent: pygidium coarsely punctate, strongly carinate, the carina strongly projecting, and truncate at apex. Prosternum densely, coarsely rugose, and densely clothed with moderately long, semierect, whitish hairs; prosternal lobe broad, moderately declivous, and broadly but not very deeply, arcuately emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then arcuately narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a very short, broad tooth on inner margin at apex. Posterior tarsi nearly as long as the tibiae, and the first joint as long as the following three joints united. Tarsal claws nearly similar, anterior and middle pairs cleft one-third from tip, and the teeth nearly equal in length; posterior claws cleft near middle, the inner tooth slightly shorter than outer one, feebly turned inward, but the tips distant.

Female.—Differs from the male in having the front of head uniformly brownish cupreous, broader, slightly more convex, and the lateral margins more parallel to each other; eyes slightly narrower and equally rounded above and beneath; abdominal segments convex at middle, last abdominal segment more broadly rounded at apex, and the tibiae without a distinct tooth at apex.

Length, 7.5–9.75 mm.; width, 1.75–2.50 mm.

Type locality.—Yreka, Calif.

Other localities.—California: Palo Alto; Oakridge; Cole; and Moore, Menlo Park. British Columbia: Merrit, Midday Valley. Montana: Missoula.

Type, allotype, and paratypes.—Cat. No. 40997, U.S.N.M. Paratypes in the collections of C. A. Frost, W. J. Chamberlin, J. N. Knull, Ralph Hoppings, H. E. Burke, and the Canadian National Collection.

Described from 31 specimens (one type). Type and one male paratype collected at the type locality June 11, on Lombardy poplar (*Populus nigra* var. *italica* DuRoi) by H. E. Burke; allotype and three paratypes reared from wood of the same host collected at Palo Alto, by R. D. Hartman; eight paratypes from Palo Alto, reared from black cottonwood (*Populus trichocarpa* Hooker), by R. D. Hartman; two paratypes collected at Moore, Menlo Park, during July on poplar by H. E. Burke; two paratypes collected at Cole, during July; four paratypes collected at Oakridge, May 30 and June 29, on Oregon alder (*Alnus rubra* Bongard) by W. J. Chamberlin; three paratypes from Missoula, Mont., reared from black cottonwood (*Populus trichocarpa* Hooker) by J. J. Sullivan; and six paratypes collected at Merritt, Midday Valley, British Columbia, during July, by K. F. Auden.

These specimens vary considerably in size, but are rather uniform in coloration, although the specimens from Oakridge, which were collected on alder, have the elytra more golden green, with only a feeble cupreous tinge. The depressions on the pronotum show considerable variation.

This species is closely allied to *niveiventris* Horn, and *fulminans* Fisher. From the former it differs in being more shining above, the pubescent spots on the eyltra more distinct, and the larvae live in poplar and cottonwood. In *fulminans* the pubescence on the sides of the abdomen form more or less distinct spots, the size is smaller and more uniform, the males have the first abdominal segment flattened, and the second segment with a vaguely depressed smooth space at the middle on the basal half, and the larvae live in willow.

48. AGRILUS BETULAE, new species

Male.—Form similar to that of *anxius* Gory, but slightly more slender, rather strongly flattened above, and feebly shining; head aeneous in front and becoming cupreous on the occiput; pronotum and elytra bottle green with a distinct purplish tinge, especially toward the sides; beneath cupreous, with a feeble purplish reflection, and more shining than above.

Head with the front rather narrow, nearly flat, and about equal in width at top and bottom, and lateral margins broadly, arcuately expanded at middle, and without a distinct longitudinal groove; surface finely, densely punctate, and densely clothed with long, recumbent, yellowish pubescence, which nearly conceals the surface; epistoma broadly and rather deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints slightly longer than wide; eyes large, broadly elongate, and about equally rounded above and beneath.

Pronotum two-fifths wider than long, base and apex about equal in width, and widest at middle; sides arcuately rounded from apical angles to base; when viewed from the side the marginal and submarginal carinae are strongly sinuate, narrowly separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, and the median lobe broadly rounded; base broadly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, a more or less distinct median depression composed of two parts, a round depression on each side of middle anteriorly, and with broad, shallow lateral depressions, and sharply defined, arcuate prehumeral carinae; surface coarsely, closely, and deeply transversely rugose, with numerous punctures between the rugae, and sparsely clothed with short, semierect, whitish hairs. Scutellum rather strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind the middle; sides vaguely rounded for a short distance behind base, broadly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and coarsely serrulate; sides of abdomen scarcely exposed above; disk rather strongly flattened anteriorly, without distinct costae, the sutural margins feebly elevated posteriorly, and with broad, deep basal depressions; surface densely, rather coarsely imbricate-punctate, and sparsely clothed with short, recumbent, whitish hairs, which are more uniformly distributed posteriorly and along the sides.

Abdomen beneath finely, densely punctate at middle, becoming more densely punctate toward the sides, transversely rugose on basal segment, and clothed with moderately long, semierect, whitish hairs, which are sparsely placed on the median part but becoming denser toward the sides; first segment broadly concave at middle, and the bottom of the concavity rugose; second segment with a smooth, deep depression extending from the anterior margin to behind the middle of segment; last segment transversely truncate at apex; vertical portions of segments not conspicuously pubescent; pygidium coarsely punctured, strongly carinate, the carina strongly projecting, and truncate at apex. Prosternum finely, densely punctate, densely rugose, and rather densely clothed with moderately long, semierect, white hairs; prosternal lobe broad, rather strongly declivous, and broadly, vaguely emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a very small tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint about as long as the following three joints united. Tarsal claws dissimilar, anterior and middle ones cleft near apex, the teeth nearly equal in length, and the inner ones not turned inward; posterior claws cleft near the middle, and the inner tooth much shorter than outer one. Genitalia similar to those of *anxius* Gory.

Length, 7.5 mm.; width, 1.75 mm.

Female.—Differs from the male in having the front of head reddish cupreous, sparsely pubescent, and the sides more parallel to each other; first and second abdominal segments convex at middle; tibiae unarmed at apex, and the tarsal claws similar on all feet, cleft near the middle, and the inner tooth much shorter than the outer one.

Type locality.—Plummer Island, Md. (near Washington, D. C.).

Other localities.—Fairfax County, Va.

Type and allotype.—Cat. No. 40998, U.S.N.M.

Paratype.—Collection Warren Knaus.

Described from three specimens, two males and one female (one type). One male and female reared from pupae collected in pupal cells in river birch (*Betula nigra* Linnaeus) at Plummer Island, Md., on April 23, 1905, by A. D. Hopkins. The pupal cells were common in the outer sapwood of small trees, which evidently had died the previous summer. One male paratype received from Warren Knaus, and labeled "Fairfax County, Virginia, June 20, 1912."

This species is closely allied to *pensus* Horn and *anxius* Gory, but is more slender posteriorly than either of these two species, the upper surface is of a different color, and the males have the head densely pubescent in front.

49. AGRILUS PENSUS Horn

Agrilus pensus Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 305.—Gibson, 43d Rept. Ent. Soc. Ontario for 1912 (1913), p. 216 (separate p. 14).—Frost, Canad. Ent., vol. 47, 1915, p. 144.—Nicolay, Ent. News, vol. 30, 1919, p. 277.—Frost, Canad. Ent., vol. 52, 1920, p. 27.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 209.—Knull, Canad. Ent., vol. 54, 1922, p. 84; Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 45–46.—Chamberlin, Cat. Buprestidae, 1926, p. 76.

Male.—Form similar to that of *anxius* Gory, slightly flattened above, and feebly shining; head bronzy green, becoming brownish cupreous on the occiput; pronotum and elytra dark reddish cupreous, sometimes with a feeble blackish green tinge; beneath reddish cupreous, the legs more or less greenish, and more shining than above.

Head with the front rather narrow, feebly, broadly depressed on vertex and occiput, about equal in width at top and bottom, the lateral margins feebly, broadly constricted near bottom, arcuately expanded at vertex, and with a narrow, longitudinal groove extending from the occiput to middle of front; surface coarsely, densely punctate on the front, becoming somewhat longitudinally rugose on the occiput, and rather sparsely clothed with long, recumbent, whitish hairs, which are slightly denser on lower half; epistoma slightly transverse between the antennae, and broadly but not deeply arcuately emarginate in front; antennae extending slightly beyond middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes large, strongly elongate, and equally rounded above and beneath.

Pronotum one-half wider than long, base and apex about equal in width, and widest at middle; sides arcuately rounded from apical angles to near base, where they are feebly sinuate; when viewed from the sides the marginal and submarginal carinae are sinuate rather narrowly separated anteriorly, and connected to each other at or near the base; anterior margin feebly sinuate, and the median lobe feebly, broadly rounded; base feebly, broadly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, a more or less distinct median depression composed of two parts, sometimes a round depression on each side of middle anteriorly, with broad, moderately deep lateral depressions, and sharply defined prehumeral carinae; surface obsoletely granulose, densely, rather coarsely, transversely rugose, finely, sparsely punctate between the rugae, and sparsely, uniformly clothed with short, whitish hairs. Scutellum rather strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly constricted in front of middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, rather narrowly rounded, and coarsely serrulate; sides of abdomen rather broadly exposed above; disk slightly flattened, costae sometimes feebly indicated, sutral margins elevated behind middle, and with broad, deep basal depressions; surface densely, irregularly imbricate-punctate, and sparsely, uniformly clothed with short, recumbent, whitish hairs, sometimes becoming denser and forming an obsolete spot on each elytron at middle and apical third.

Abdomen beneath finely, sparsely punctate at middle, densely punctate toward the sides, densely, transversely rugose at sides of basal segments, and clothed with moderately long, recumbent, whitish hairs, which are very sparsely placed on median parts but becoming denser toward the sides; first segment broadly longitudinally concave at middle, and the bottom of the concavity roughly sculptured; second segment with a smooth, deep depression extending from anterior margin to near the posterior margin; last segment obtusely rounded, or subtruncate at apex; vertical portions of segments rather densely but not conspicuously pubescent; pygidium coarsely punctate, strongly carinate, the carina strongly projecting, and truncate at apex. Prosternum densely rugose, finely punctate, and sparsely, uniformly clothed with moderately long, semierect, whitish hairs; prosternal lobe broad, moderately declivous, and broadly, feebly emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a very small tooth on inner margin at apex. Posterior tarsi shorter than tibiae, and the first joint about as long as the following three joints united. Tarsal claws dissimilar, anterior and middle ones cleft near apex, the teeth nearly equal in length, and the inner one not turned inward; posterior claws cleft near middle, and the inner tooth much shorter than outer one. Genitalia similar to those of *anxius* Gory.

Length, 7.5 mm.; width, 2 mm.

Female.—Differs from the male in having the front of head uniformly reddish cupreous, slightly wider, and sides nearly parallel to each other; first and second abdominal segments convex at middle; tibiae unarmed at apex; and the tarsal claws similar on all feet, cleft near middle, and the inner tooth much shorter than outer one.

Redescribed from the male lectotype No. 3481 in the Academy of Natural Sciences of Philadelphia.

Type locality.—Massachusetts (probably from Tyngsboro).

DISTRIBUTION

Material examined:

MAINE: Wales, June 23; Monmouth, June 27 (C. A. Frost). Meddyhemps, June 25 (R. J. Sim).
MASSACHUSETTS: No definite locality—probably Tyngsboro (Blanchard).
NEW BRUNSWICK: Bathurst, July 2–24 (J. N. Knull).
NEW HAMPSHIRE: Bretton Woods, June 30 (Van Duzee).
NEW JERSEY: Newfoundland, July 4 (A. S. Nicolay).
NOVA SCOTIA: Greenfield, July 13–16 (——).
    Port Medway, Aug. 14 (P. G. Bolster).
PENNSYLVANIA: Charter Oak, July 5 (J. N. Knull).

Variations.—The coloration is rather constant in the specimens examined, but the depressions on the pronotum vary similar to those in *anxius*. In some examples the prehumeral carinae on the pronotum are larger, strongly arcuate, and more distinct than in others, and in some of the examples examined the costae on the elytra are feebly indicated, whereas in others they are entirely obliterated. Length 7 to 8.5 millimeters.

Hosts.—The larval habits of this species are unknown, but C. A. Frost has collected the adults on the foliage of alder (*Alnus incana* Linnaeus) and Hop-hornbeam or ironwood (*Ostrya virginiana* (Miller) Koch).

This species is very closely allied to *anxius* Gory, and usually can only be separated from that species by the coloration, which is reddish cupreous. The head is usually broadly depressed on the vertex and the pubescence on the elytra has a tendency to form a spot on each elytron at the middle and apical third. The groove on the second abdominal segment, which was used by Horn (1891) for separating the males from *anxius*, is of little use, as it is more or less variable. On examining the lectotype of *pensus*, this groove was found to be identical with the groove on some specimens of *anxius*.

All of the specimens examined are rather uniform in coloration and are from the northeastern part of the United States and Canada, many of which are probably from the type series collected by Blanchard. Chamberlin (1926) records it from Illinois, but I have not seen any examples from that region. This species may only represent a color variety of *anxius*, but since nothing is known of its habits, it is best to retain it for the present, at least, as a valid species.

50. AGRILUS HORNI Kerremans

Agrilus blanchardi HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 305–306 (name preoccupied).—FROST, Psyche, vol. 16, 1909, p. 67.—BLATCHLEY, Coleoptera of Indiana, 1910, p. 801.—CHAGNON, 9th Rept. Quebec Soc. Protection Plants, suppl., pt. 3, 1917, p. 219.

Agrilus horni KERREMANS, Ann Soc. Ent. Belgique, vol. 44, 1900, p. 341.—BRITTON, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 244.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 65 (part).

Male.—Form similar to that of *anxius*, slightly flattened above, and feebly shining; head bronzy green in front, becoming brownish cupreous on the occiput; pronotum dark brown, with a more or less cupreous tinge; elytra olivaceous black; beneath aeneous, with a feeble cupreous reflection, and more shining than above.

Head with the front rather narrow, nearly flat, about equal in width at top and bottom, the lateral margins broadly, arcuately expanded near vertex, and with a narrow, longitudinal groove extending from the occiput to middle of front; surface rather coarsely, irregularly rugose, densely, coarsely punctate, and sparsely clothed with short, semierect, white hairs on lower half, and a distinct, round, smooth elevation on each side behind the antennal fovea; epistoma transverse between the antennae, and the anterior margin elevated, and broadly, rather deeply, arcuately emarginate; antennae extending to about middle of pronotum, serrate from the fourt joint, and the outer joints about as long as wide; eyes large, strongly elongate, and almost equally rounded beneath and above.

Pronotum one-half wider than long, base and apex equal in width, and widest at middle; sides regularly, arcuately rounded from apical angles to near base, where they are feebly sinuate; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina feebly sinuate, the two carinae widely separated anteriorly, and connected to each other near the base; anterior margin feebly sinuate, and the median lobe feebly, broadly rounded; base feebly, broadly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, with a broad, shallow depression in front of scutellum, a round, rather deep depression on each side of middle, a broad, oblique, depression on each side along lateral margin extending to base, and with sharply defined, arcuate, prehumeral carinae; surface finely, densely, transversely rugose, finely, densely punctate between the rugae, and sparsely clothed with very short, inconspicuous hairs. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides parallel for a short distance behind base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather narrowly rounded, and strongly serrulate; sides of abdomen narrowly exposed above; disk feebly flattened, with the costae vaguely indicated, sutural margins slightly elevated behind the middle, and with broad, deep, basal depressions; surface densely, finely imbricate-punctate, and rather sparsely uniformly clothed with short, recumbent whitish pubescence.

Abdomen beneath finely, densely punctate, the punctures slightly denser toward the sides, somewhat rugose at sides of basal segments, and rather densely clothed with short, recumbent, whitish hairs; first and second segments each with a deep, smooth median groove, the one on the second segment extending nearly to the posterior margin; last segment transversely truncate; vertical portions of the segments rather densely but not conspicuously pubescent; pygidium coarsely punctate, strongly carinate, the carina strongly projecting, and rather acute at apex. Prosternum densely, finely, punctate, and sparsely clothed with short, recumbent, whitish pubescence; prosternal lobe broad, moderately declivous, and broadly but feebly, arcuately emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, the anterior and middle pairs armed with a short tooth on the inner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws dissimilar, anterior and middle ones cleft near the apex, the teeth equal in length, and the inner one not turned inward; posterior claws cleft near the middle, the inner tooth broad and very short. Genitalia not examined.

Length, 9 mm.; width, 2.25 mm.

Female.—Unknown.

Redescribed from the type No. 3496 in the Academy of Natural Sciences of Philadelphia.

Type locality.—Tyngsboro, Mass.

Host.—Unknown.

Horn (1891) in his original description gives the distribution as the Lake Superior region, New York, and Massachusetts, but there is only one specimen from the type locality in the Horn collection under *blanchardi.* In the LeConte collection are two specimens mounted on the same cardboard under this name, and labeled "Mass." The under side of these two examples could not be examined, so the writer was unable to decide if these specimens were *blanchardi* or *anxius.* If Horn erroneously placed specimens from Lake Superior and New York under this species, he probably removed them at a later date. Chamberlin (1926) records it from a number of different localities, but probably these, as well as the other published records for this species should apply to *anxius*.

The writer has seen only one specimen (type) which could be considered as this species, and this seems to be an abnormal specimen, however, it is advisable to retain it as a valid species. In the type the first and second abdominal segments have each a deep, smooth median groove, as stated by Horn, but it does not seem to differ in any other respect from *anxius*, which has the abdominal grooves more or less variable.

Horn described this species under the name of *blanchardi*, but this name had been previously used by Saunders for *Agrilus ater* Blanchard (name preoccupied), a species from South America, so Kerremans (1900) proposed the new name *horni*.

51. AGRILUS ANXIUS Gory

Figure 35

Agrilus anxius Dejean, Cat. Coleopt., ed. 2, 1833, p. 82; ed. 3, 1837, p. 93 (no description).—Gory, Mon. Bupr. Suppl., vol. 4, 1841, p. 226, pl. 37, fig. 217.—White, Nomenclature Coleopt, Ins. Brit. Mus., pt. 3, 1848, p. 36.—LeConte, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9; Trans. Amer. Philos. Soc., vol. 11, new ser. 1859, p. 247.—Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 93—Blanchard, Ent. Amer., vol. 5, 1889, p. 32.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 306–307.—Smith, Ins. Life, vol. 7, 1894, pp. 189–191 (this is *sinuatus* Olivier); Canad. Ent., vol. 26, 1894, p. 272 (this is *sinuatus*).—Evans, Canad., Ent., vol. 27, 1895, p. 146.—Lintner, 48th Rept. N. Y. State Mus., 1895, p. 407.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 3, no. 3, 1895, p. 38.—Bowditch, Psyche, vol, 7. 1896, suppl. 2, p. 7.—Wickham, Proc. Davenport Acad. Nat. Sci., vol. 6, 1896, p. 152 (author's edition).—Felt, Country Gentleman, vol. 63, 1898, p. 993.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 18, new ser., 1898, pp. 44–51, figs. 15–17.—Slingerland, Proc. 44th Ann. Meeting Western N. Y. Hort. Soc., 1899, pp. 72–73.—Wickham, Ent. News, vol. 10, 1899, p. 7.—Felt, Bull. N. Y. State Mus., vol. 8, no. 37, 1900, p. 24, fig. 37.—Chamberlin, Scientific Amer., vol. 82, 1900, p. 42.—Chittenden, U. S. Dept. Agri., Div. Ent., Bull. 22, new ser., 1900, pp. 64–65, 67.—Smith, 27th Rept. N. J. State Board Agric. for 1899 (1900), suppl. p. 257.—Felt, 16th Rept. N. Y. State Ent. for 1900 (1901), p. 1007.—MacGillivray and Houghton, Ent. News, vol. 13, 1902, p. 251.—Slosson, Ent. News, vol. 13, 1902, p. 6.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 5, No. 3, 1902, p. 269.—Ouellet, Le Naturaliste Canadien, vol. 29, 1902, p. 120.—Felt, 17th Rept. N. Y. State Ent. for 1901 (1902), pp. 792, 859.—Lochhead, 28th Rept. Ont. Agric. College and Exp. Farms for 1902 (1903), pp. 22–23, fig. 4; 33d Rept. Ent. Soc. Ontario for 1902 (1903), p. 68.—Evans, Canad. Ent., vol. 35, 1903, p. 291.—Chittenden, U. S. Dept. Agric., Bur. Forestry, Bull. 46, 1904, pp. 67–68, figs. 14–15.—Hop-

KINS, U. S. Dept. Agric., Yearbook for 1903 (1904), p. 322, text fig. 34*a*–34*b*, pl. 39, fig. 2; Div. Ent., Bull. 48, 1904, pp. 21, 38.—FELT, N. Y. State Mus., Mem. 8, vol. 1, 1905, pp. 284–287, pl. 40, figs. 1–2, text fig. 49; 21st Rept. N. Y. State Ent. for 1905 (1906), (no text), pl. 2.—SLINGERLAND, Cornell Agric. Exp. Sta., Bull. 234, 1906, pp. 65–78, figs. 30–38 (life history).—(——) U. S. Dept. Agric., Yearbook for 1907 (1908), p. 550.—WASHBURN, Minn. Agric. Exp. Sta., Press Bull. 33, 1908, pp. 9–10, fig. 12; 12th Rept. Minn. State Ent., 1908, pp. 98–99, fig. 44.—(——) U. S. Dept. Agric., Yearbook for 1908 (1909), p. 578.—FROST, Psyche, vol. 16, 1909, p. 67.—EASTON, Psyche, vol. 16, 1909, p. 50.—WICKHAM, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 6 (author's ed.), 1909, p. 23.—SMITH, Rept. N. J. Agric. Exp. Sta. for 1909 (1910), pp. 415–416. Rept. N. J. State Mus. for 1909 (1910), p. 295.—FELT, 25th Rept. N. Y. State Ent. for 1909 (1910), p. 98.—DAVIS, Journ. Econ. Ent., vol. 3, 1910, p. 184.—BURKE, U. S. Dept. Agric., Yearbook for 1909 (1910), p. 403, fig. 26.—GIBSON, 40th Rept. Ent. Soc. Ontario for 1909 (1910), pp. 13–14.—BLATCHLEY, Coleoptera of Indiana, 1910, p. 801, fig. 310.—HEWITT, Rept. Ent. Canad., 1910, p. 246.—SMITH, Rept. N. J. Agric. Exp. Sta. for 1910 (1911), p. 348.—FORBES, 26th Rept. State Ent. Illinois, 1911, pp. 53–55, figs. 58–59; Ill. Agric. Exp. Sta., Bull. 151, 1911, pp. 515–517, figs. 58–59.—GOSSARD, Journ. Econ. Ent., vol. 4, 1911, p. 208.—BRITTON, Journ. Econ. Ent., vol. 4, 1911, p. 544.—FROST, Canad. Ent., vol. 44, 1912, p. 252.—SANDERS, Wisc. Agric. Exp. Sta., Bull. 227, 1912, pp. 22–23, figs. 9–10.—FELT, 27th Rept. N. Y. State Ent. for 1911 (1912), pp. 108–109, 113, fig. 3; Garden Magazine, vol. 15, no. 1, 1912, p. 36.—RUGGLES, Minn. State Ent., Circ. 25, 1912, p. 3, fig. 1.—WASHBURN, 14th Rept. Minn. State. Ent., 1912, p. 57.—FERNALD, Journ. Econ. Ent., vol. 5, 1912, p. 246; 25th Rept. Mass. Agric. Exp. Sta., pt. 2, 1913, p. 85.—SWAINE, 5th Rept. Quebec Soc. Protection Plants, 1913, p. 56; 43d Rept. Ent. Soc. Ontario for 1912 (1913), p. 91.—FELT, 28th Rept. N. Y. State Ent. for 1912 (1913), p. 101.—RUGGLES, Minn. State Ent., Circ. 30, 1914, pp. 7–8.—BROOKS, U. S. Dept. Agric., Journ. Agric. Research, vol. 3, no. 2, 1914, p. 184.—SWAINE, 6th Rept. Quebec Soc. Protection Plants, 1914, p. 54; 7th Rept. Quebec Soc. Protection Plants, 1915, pp. 106–107, fig.—BLACKMAN and ELLIS, Bull. N. Y. State College Forestry, vol. 16, no. 26, 1915, pp. 46–49, figs. 16–19.—HEWITT, Rept. Ent. Canad., 1915, p. 30.—CAESAR, 45th Rept. Ent. Soc. Ontario for 1914 (1915), p. 46.—JOHNSON, Ent. News, vol. 27, 1916, p. 117.—BARTLETT, Tree Talk, vol. 4, 1916, p. 17.—FELT, Country Life in America, vol. 29, no. 5, 1916, pp. 74–76; N. Y. State Mus., Bull. 180, 1916, p. 117.—SWAINE, 47th Rept. Ent. Soc. Ontario for 1916 (1917), pp. 102–105, pl. 3, figs. 1–4.—GIBSON, 47th Rept. Ent. Soc. Ontario for 1916 (1917), p. 149.—HUTCHINGS, 9th Rept. Quebec Soc. Protection Plants, 1917, pp. 66–70, figs. 1–2.—CHAGNON, 9th Rept. Quebec Soc. Protection Plants, suppl. pt. 3, 1917, p. 331.—TURNER, Ga. Board Ent., Bull. 49, 1918, p. 28, (probably not this species).—WASHBURN, Inj. Ins., 1918, p. 262–263, fig. 265.—HOUSER, Ohio Agric. Exp. Sta., Bull. 332, 1918, pp. 326–327, pl. 70, fig. 2.—SWAINE, Canad. Forestry Journ., vol. 14, 1918, pp. 1928–1929, fig.—FELT, N. Y. State Mus., Bull. 200, 1918, p. 49.—SWAINE, 11th Rept. Quebec Soc. Protection Plants, 1919, p. 48, pl. 9, fig. 2.—HOFER, U. S. Dept. Agric., Farmers' Bull. 1154, 1920, p. 9.—HEWITT, Rept. Canad. Ent. and Zool. for 1917–18, (1920), p. 15.—KNULL, Ent. News, vol. 31, 1920, p. 10.—FROST and WEISS, Canad. Ent., vol. 52, 1920, pp. 209–210, 247.—Frost, Canad. Ent., vol. 52, 1920, pp. 28, 250.—Hollister, Journ. Econ. Ent., vol. 13, 1920, pp. 145–146.—Kotinsky, U. S. Dept. Agr., Farmers' Bull. 1169, 1921, pp. 59–61, figs. 38–40.—Gillette, 12th Ann. Rept. State Ent. Colorado for 1920 (1921), p. 23.—Maheux, 14th Rept. Quebec, Soc. Protection Plants, 1922, p. 66.—Lord, Care of Shade Trees, 1922, p. 39.—Gossard, U. S. Dept. Agric., Bull. Ins. Pest Survey, vol. 2, 1922, p. 24.—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, pp. 4–5, fig. 1.—Knull, Canad. Ent., vol. 54, 1922, p. 84.—Hutchings, 15th Rept. Quebec Soc. Protection Plants, 1923, p. 89.—Gibson, Rept. Ent. Canad. for 1919–1920 (1923), p. 18.—Pierson, Maine Forest Serv., Bull. 1, 1923, p. 51.—Britton, Conn. Agric. Exp. Sta., Bull. 247, 1923, pp. 359–361, pl. 14, figs. *c*, *d*.—Spicer, Tree Talk, vol. 5, 1923, p. 21, fig. —Felt, 35th Rept. N. Y. State Ent. for 1921 (1923), pp. 78–79; Man. Tree and Shrub Ins., 1924, pp. 52–53, figs. 15–16.—Britton, Conn. Agric. Exp. Sta., Bull. 263, 1924, p. 164.—Mundinger, N. Y. State College Forestry, Tech. Pub. 17, pt. 4, 1924, p. 316.—Chamberlin, Journ. N. Y. Ent. Soc., vol. 32, for 1924 (1925), p. 193.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 45.—Essig, Ins. Western North America, 1926, p. 403.—Chamberlin, Cat. Buprestidae, 1926, pp. 49–50.—Pierson, Journ. Forestry, vol. 25, 1927, pp. 68–72.—Britton and Zappe, Conn. Agric. Exp. Sta., Bull. 292, 1927, pp. 147–148, fig. 26.

Agrilus bilineatus Moffatt (not Weber), 30th Rept. Ent. Soc. Ontario for 1899 (1900), p. 100.

Agrilus torpidus LeConte, Trans. Amer. Ent. Soc., new ser., vol. 11, 1859, p. 247.—Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 93.—Austin, Proc. Boston Soc. Nat. Hist., vol. 16, 1874, p. 269.—Hubbard and Schwarz, Proc. Amer. Philos. Soc., vol. 17, 1878, p. 636.—Harrington, Canad. Ent., vol. 16, 1884, p. 101; 15th Rept. Ent. Soc. Ontario for 1884 (1885), p. 31.—Lintner, 42d Rept. N. Y. State Mus., 1889, p. 283.—Blanchard, Ent. Amer., vol. 5, 1889, p. 32.—Cook, 29th Rept. Mich. Board Agric., 1890, pp. 118–119.—Davis, Ins. Life, vol. 4, 1891, p. 66; 22d Rept. Ent. Soc. Ontario for 1891 (1892), p. 81.—Cockerell, Trans. Amer. Ent. Soc., vol. 20, 1893, p. 329.—Hausen, Canad. Record Sci., vol. 5, 1892, p. 52.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 18, new ser., 1898, p. 49.

Agrilus gravis LeConte, Trans. Amer. Ent. Soc., new ser., vol. 11, 1859, p. 247.—Provancher, Petite Faune Entomologique du Canada, vol. 1, Les Coleopteres, 1877, pp. 358–359.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 18, new ser., 1898, p. 49.

Male.—Form rather robust, slightly flattened above, and subopaque; head bronzy green in front, becoming brownish on the occiput; pronotum and elytra olivaceous black, sometimes with a distinct reddish cupreous tinge, especially on the pronotum; beneath slightly more greenish and shining than above.

Head with the front rather narrow, nearly flat, about equal in width at top and bottom, the lateral margins feebly, broadly constricted near the bottom, and arcuately expanded at vertex, and with a narrow longitudinal groove extending from occiput to middle of front; surface coarsely, densely punctate, becoming longitudinally rugose on the occiput, and rather sparsely clothed with long, recumbent, whitish pubescence on lower half; epistoma slightly transverse between the antennae, and broadly but not deeply, arcuately emarginate in front; antennae extending slightly beyond middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes large, strongly elongate, and equally rounded above and beneath.

Pronotum one-half wider than long, base and apex equal in width, and widest at middle; sides strongly arcuately rounded from apical angles to near base, where they are feebly sinuate; when viewed from the side the marginal and submarginal carinae are rather strongly sinuate, rather widely separated anteriorly, and connected to each other at or near the base; anterior margin feebly sinuate, and the median lobe feebly, broadly rounded; base feebly, broadly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, a more or less distinct median depression composed of two parts, on each side often a round, shallow depression, with broad, moderately deep lateral depressions, and sharply defined, arcuate, prehumeral carinae; surface obsoletely granulose, densely but not deeply, transversely rugose, finely, sparsely punctate between the rugae, and sparsely, uniformly clothed with short, inconspicuous hairs. Scutellum strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides parallel for a short distance behind base, broadly constricted in front of middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, rather acutely rounded, and strongly serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, costae vaguely indicated, sutural margins elevated behind middle, and with broad, deep, basal depressions; surface densely, finely imbricate-punctate, and sparsely, uniformly clothed with short, recumbent, whitish hairs.

Abdomen beneath finely punctate, denser toward the sides, strongly rugose on basal segments, and sparsely, uniformly clothed with moderately long, semierect, whitish hairs, first segment broadly, longitudinally concave at middle, and the bottom of the concavity roughly sculptured; second segment with a smooth, deep groove, wider in front than behind, and extending from anterior margin to apical third; last segment transversely truncate or feebly emarginate at apex; vertical portions of the segments rather densely but not conspicuously pubescent; pygidium coarsely punctate, strongly carinate, the carina strongly projecting, and truncate at apex. Prosternum densely, finely rugose, densely punctate, and sparsely, uniformly clothed with moderately long, semierect, whitish hairs; prosternal lobe broad, rather strongly declivous, and broadly, feebly emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, the anterior and middle pairs armed with a very small tooth on inner margin at apex. Posterior tarsi shorter than tibiae, and the first joint about as long as the following three joints united. Tarsal claws dissimilar, anterior and middle ones cleft near apex, the teeth nearly equal in length, and the inner one not turned inward; posterior claws cleft near middle, and the inner tooth much shorter than outer one.

Female.—Differs from the male in having the front of head more cupreous, slightly wider, sides more parallel, and the surface less densely pubescent; first and second abdominal segments convex or feebly flattened at middle; tibiae unarmed at apex, and the tarsal claws similar on all feet, cleft near middle, and the inner tooth much shorter than outer one.

Length, 5.5–13 mm.; width, 1.5–3 mm.

Type locality.—Of *anxius*, North America; present location of type unknown to writer. Of *torpidus*, Lake Superior; type in Museum of Comparative Zoölogy. Of *gravis*, Lake Superior; type in Museum of Comparative Zoölogy.

Distribution.—This species has a wide distribution, and will probably be found wherever its host plants occur, but so far it has not been reported from the southern part of the United States, except in the Rocky Mountain region, where its range extends southward to Arizona and New Mexico. Material has been examined from the southern part of Canada (Alberta, New Brunswick, Ontario, Quebec, and British Columbia) and from various localities in the following States: Arizona, Colorado, Connecticut, Illinois, Indiana, Iowa, Maine, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Virginia, West Virginia, and Wisconsin.

Variations.—The species is quite variable in coloration, which varies from a uniform olivaceous black to bluish gray, with a more or less cupreous reflection, to those having the pronotum distinctly more reddish cupreous, and which resembles some forms of *arcuatus* Say. The depressions on the pronotum are extremely variable, in some examples the median depression is entire, whereas in others it is divided into two parts, and occasionally one of these depressions is only feebly indicated, and again in some specimens there is a small round depression on each side of the middle anteriorly, but in others these depressions are entirely absent. The elytral costae are usually feebly indicated but in a few examples they are entirely obliterated, and rarely there are two vague costae on each elytron. The concavity on the second abdominal segment of the male is not constant, and it varies from a narrow, parallel sided groove, to one that is distinctly wider in front than behind, but in all cases the first segment is broadly concave, and the bottom roughly sculptured.

Hosts.—This is the most serious pest of the European white birch, particularly the cut-leaved form, but it also attacks our native birches and poplars, especially when cultivated for ornamental purposes. Swaine (1918) reports that about 50 per cent of the white birches have been badly injured in the Province of Quebec, and in some of the parks in the United States practically all of the birches have been killed. It has been reared from yellow birch (*Betula lutea* Michaux), black or sweet birch (*B. lenta* Linnaeus), paper birch (*B. papyrifera* Marshall), red birch (*B. fontinalis* Sargent), gray or white birch (*B. populifolia* Marsh), European white birch (*B. alba* Linnaeus) and its cut-leaf form, aspen (*Populus tremuloides* Michaux), large-tooth aspen (*P. grandidentata* Michaux), cottonwood (*P. deltoides* Marshall), Carolina poplar (*P. deltoides pilosa* (Sargent) Sudworth), balsam poplar (*P. balsamifera* Linnaeus), northern black cottonwood (*P. trichocarpa hastata* Henry), balm-of-gilead (*P. balsamifera candicans* (Aiton) Gray). Cook (1890) and Davis (1891, 1892) record this species as making galls on pussy willow (*Salix discolor* Muehlenberg), but the writer has not seen any specimens from this host. Turner (1918) records it from pecan, but this record was made without any doubt from an incorrectly identified specimen.

This species has received considerable attention from the economic entomologists, due to the great amount of injury caused to ornamental birches in the southern part of Canada and northern part of the United States, and is commonly known as the "bronze birch borer."

Chamberlin (1926) records the species from southern California, but this is incorrect, as the specimen mentioned in the collection of the Academy of Natural Sciences of Philadelphia is not this species.

LeConte separated *anxius* from *gravis* from the fact that the groove on the head is deeper and longer, the prehumeral carinae less distinct, the elytra with a vague discal costa, and the pronotum more brassy than the elytra, but all of these characters are variable, and all forms of intermediates can be found in a series of specimens. Horn (1891, p. 307) states that both *torpidus* and *gravis* were described by LeConte from females, but on examining the types in the LeConte collection *torpidus* (No. 10 in the *anxius* series) is a male which agrees with his description of that species and which was without any doubt made from a male, as LeConte writes that it differs from *anxius* and *gravis* by the front of the head being pubescent, which is a male sexual character. *Agrilus gravis* (No. 8 in the *anxius* series) is a female of *torpidus* and agrees with his description.

52. AGRILUS CAVATUS Chevrolat

Figure 36

Agrilus cavatus Chevrolat, Silbermann's Revue Entomol., vol. 5, 1838, p. 99.—Horn, Ent. Amer., vol. 3, 1887, p. 145.—Waterhouse, Biol. Centr.-Amer. Coleopt., vol. 3, pt. 1, 1889, p. 69.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 310.—Dugès, La Naturaleza, ser. 2, vol. 2, 1891, p. 22, pl. 2, fig. 33.—Fall, Ent. News, vol. 17, 1906, p. 168.—Chamberlin, Cat. Buprestidae, 1926, p. 56.

Agrilus texanus Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 94.

Male.—Form elongate, strongly attenuate posteriorly, rather strongly flattened above, and of a reddish or bronzy cupreous color; beneath aeneous, becoming more reddish cupreous posteriorly, and more shining than above.

Head with the front rather narrow, slightly wider at top than bottom, lateral margins nearly parallel from top to middle, then obliquely narrowed to the bottom, broadly and very deeply excavated, forming two large elevations at lower inner margin of eyes, the excavation broadly rounded, extending to the lateral margins, and posteriorly to the occiput, with a deep, longitudinal depression extending from it to the epistoma, and with a deep transverse groove behind the epistoma; surface very coarsely, sparsely punctate in front, but the punctures becoming more or less confluent posteriorly, and clothed with long yellowish hairs in the longitudinal depression behind the epistoma; epistoma rather narrow between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fourth joint, and the outer joints slightly wider than long; eyes large, broadly oblong, and distinctly more broadly rounded beneath than above.

Pronotum nearly one-half wider than long, about equal in width at base and apex, and widest near the middle; sides feebly, arcuately rounded; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina nearly straight, the two carinae rather widely separated anteriorly, and connected to each other at the base; anterior margin feebly sinuate and the median lobe scarcely developed; base transversely truncate to middle of each elytron, then extending obliquely backward to the scutellum, in front of which it is broadly subtruncate; disk moderately convex, with a broad, deep median depression, wider behind than in front, and extending from base to apex, a broad, deep depression on each side along the lateral margin at middle, and with an obsolete elevation replacing the prehumeral carina; surface coarsely, densely rugose, the rugae transverse on disk, but becoming irregularly placed toward the sides, densely, irregularly punctate between the rugae, and sparsely clothed with inconspicuous hairs. Scutellum transversely carinate, and the surface finely reticulate.

Elytra about equal in width to the pronotum at base, and distinctly wider at base than just behind the middle; sides nearly parallel for a short distance behind the base, broadly, arcuately constricted in front of middle, feebly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and coarsely serrulate; sides of abdomen broadly exposed above; disk feebly flattened, with a vague costa extending from the humerus to apical third, feebly, longitudinally depressed on each side of the suture, which is strongly elevated posteriorly, and with broad, deep basal depressions; surface finely, densely punctate, smoother on the costae, more imbricate toward the sides, sparsely clothed with short, inconspicuous hairs, and each elytron with an indistinct vitta of sparsely, irregularly placed, yellowish white hairs, extending from humerus to behind the middle, and with two denser pubescent spots along the suture, one at apical third, the other midway between it and the apex.

Abdomen beneath rather densely, coarsely punctate, transversely rugose at sides of the first two segments, sparsely clothed with recumbent, whitish hairs, and with a densely pubescent spot at sides of third segment; first segment convex at middle, without a median groove; last segment broadly rounded at apex; vertical portions of the segments densely clothed with long recumbent, yellowish white pubescence, except the second, which is nearly glabrous; pygidium coarsely punctate, strongly carinate, but the carina not projecting. Prosternum sparsely, coarsely punctate, and sparsely clothed with rather long, recumbent, whitish hairs; prosternal lobe broad, feebly declivous, and broadly rounded in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, nearly straight, anterior pair strongly flattened, and the anterior and middle pairs with a distinct tooth on inner margin at apex. Posterior tarsi distinctly shorter than the tibiae, and the first joint about as long as the following three joints united. Tarsal claws dissimilar, anterior and middle ones cleft near the tip, and the teeth nearly equal in length, the posterior ones cleft near the middle, the inner tooth broader and shorter than the outer one, and not turned inward.

Female.—Differs from the male in being slightly less attenuate posteriorly, front of head wider, antennae slightly shorter, tooth on anterior and middle tibiae not so distinct, and the claws similar on all feet, cleft near the middle, the outer tooth long and acute at apex, the inner one short and broad.

Length, 8.2–14.5 mm.; width, 2–3.75 mm.

Type localities.—Of *cavatus*, Mexico; present location of type unknown to writer. Of *texanus*, Texas; cotypes in the Academy of Natural Sciences of Philadelphia, and the Museum of Comparative Zoölogy at Cambridge, Mass.

DISTRIBUTION

Recorded from the following localities:

MEXICO: Northern Sonora (Morrison). Cerro de Plumas; Almolonga; Acapulco in Guerrero (Höge). Cordova; Vera Cruz (Sallé, Höge). Jalapa (Höge).

ARIZONA: Pinal Mountains (——). Nogales August 31 (C. Schaeffer). "Arizona" (Morrison).

TEXAS: New Braunfels (——). Flotonia, July 30 (H. Wenzel). Fedor; Bethage, May 7 (——). "Texas" (Belfrage).

Variations.—This species is extremely variable in size, and the color varies from a golden or bronzy green to reddish cupreous. In carefully collected specimens the elytral vitta extends from the humerus to apical third, forming at its end a denser spot, on each side there is a short pubescent vitta opposite the end of the former, and a short distance in front of the apex is a small pubescent spot. This vitta is easily lost by abrasion, and in many of the examples examined, only the basal spot, apical end of the vitta, and the anteapical spot are distinct. In most cases the prehumeral carina is replaced by a slight elevation, but occasionally a specimen is found in which the carina is obsoletely indicated.

Host.—Unknown.

This species is rare in collections and nearly all of the examples examined are labeled simply, "Texas, Belfrage," or "Arizona, Morrison." Chamberlin (1926) records it from Florida, but this is an error and probably refers to *concinnus* Horn, a closely allied species. The sexes are very similar, and the characters given by Horn (1891) for separating them are of little value. The tarsal claws are not alike in the two sexes, and both sexes have the anterior and middle tibiae armed with a small tooth, only the tooth being shorter and less conspicuous in the female, and the other characters given are more or less variable.

53. AGRILUS AUREUS Chevrolat

Figure 37

Agrilus aureus CHEVROLAT, Silbermann's Revue Entomol., vol. 5, 1838, pp. 98–99.—WATERHOUSE, Biol. Centr.-Amer., Coleopt., vol. 3, pt. 1, 1889, p. 103.—DUGÈS, La Naturaleza, ser. 2, 1891, p. 29, pl. 2, fig. 45.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 53.

Agrilus couesii LeConte, Proc. Acad. Nat. Sci. Phila., vol. 18, 1866, p. 384.—Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 94.—LeConte, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 333.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 309, pl. 8, fig. 1.—Cockerell, Journ. N. Y. Ent. Soc., vol. 5, 1897, p. 150; New Mex. Exp. Sta., Bull. 28, 1898, p. 152.—Chittenden, U. S. Dept. Agric., Div. Ent., new ser., Bull. 22, 1900, p. 67.—Schaeffer, Brooklyn Inst. Mus., Sci. Bull. vol. 1, no. 6, 1905, p. 131.—Fall, Ent. News, vol. 17, 1906, p. 168.—Fall and Cockerell, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 180.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 210.

Female.—Form elongate, rather slender, and strongly flattened above; bronzy green, with the median part of pronotum, longitudinal costae, sutural margins, and sutural depression of elytra posteriorly, more or less brownish or purplish black; beneath bronzy green, and more shining than above.

Head with the front narrow, slightly wider at top than at bottom, lateral margins feebly, arcuately expanded at middle, broadly concave, more deeply and broadly depressed at middle of front, an oblong, irregular elevation on each side of middle behind base, and a deep transverse groove behind the epistoma extending to the lateral margins; surface densely and very coarsely punctate on the front, becoming somewhat rugose on the occiput, and without distinct pubescence; epistoma slightly transverse between the antennae, and broadly, deeply, arcuately emarginate in front; antennae short, not extending to middle of pronotum, serrate from the fourth joint, and the outer joints wider than long; eyes large, broadly oblong, and slightly more broadly rounded beneath than above.

Pronotum one-third wider than long, and about equal in width at base and apex; sides nearly parallel from base to near apex (slightly sinuate near base), then arcuately narrowed to the apical angles; when viewed from the side the marginal carina is strongly arcuate anteriorly, the submarginal carina nearly straight, obsolete anteriorly, and connected to the marginal carina near base; anterior margin strongly sinuate, with the median lobe broadly rounded; base transversely truncate to middle of each elytron, then extending obliquely backward to the scutellum, in front of which it is broadly truncate; disk moderately convex, with a broad, deep median depression extending from base to apex, a broad, rather deep depression on each side along lateral margin at middle, and a feebly elevated, straight prehumeral carina extending from base to basal third; surface sparsely, coarsely punctate, becoming irregularly, longitudinally rugose at sides and in median depression, and broadly, densely clothed at the sides with long, recumbent, whitish pubescence, with a few hairs of the same color in the median depression. Scutellum not transversely carinate, but the surface smooth, except at the middle, where it is densely punctate and slightly depressed.

Elytra about equal in width to the pronotum at base, and slightly wider at base than just behind the middle; sides nearly parallel for a short distance behind the base, feebly, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, or subtruncate, and coarsely, irregularly serrulate; sides of abdomen broadly exposed above; disk slightly flattened, with a distinct, broad, smooth costa extending from the humeri to near the apex, the sutural margins distinctly elevated behind the middle, and with broad, shallow basal depressions; surface densely, finely punctate (except on the costae), more coarsely toward the sides, and each elytron ornamented with a broad vitta between the costa and suture, extending from the basal depression to the apex, and interrupted twice in the apical region, and composed of densely placed, recumbent whitish hairs. There is also an obsolete vitta of sparsely, irregularly placed hairs of the same color toward the lateral margin.

Abdomen beneath rather sparsely, coarsely punctate on the median part, more densely toward the sides; first and second segments with a densely pubescent vitta a short distance from the lateral margins, and extending along the lateral margins of the following segments; first segment convex at middle, and without a median groove; last segment broadly rounded at apex; vertical portions of segments densely clothed with recumbent, whitish pubescence; pygidium feebly carinate at middle, but the carina not projecting. Prosternum coarsely and rather densely punctate, the punctures more or less confluent posteriorly, and nearly glabrous; prosternal lobe broad, moderately declivous, and feebly, broadly, arcuately emarginate in front; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then broadly rounded to the apex, which is rather obtuse. Tibiae slender; anterior and middle pairs arcuate, and armed with a short tooth on inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint slightly longer than the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth long and acute at tip, the inner one much shorter and broader, and not turned inward.

Length, 10.5 mm.; width, 2.75 mm.

Male.—Differs from the female in having the front of head sparsely clothed with long, recumbent, whitish hairs, especially behind the epistoma; prosternum and middle part of body densely clothed with long, semierect, whitish hairs, and all three pairs of tibiae armed with a strong tooth on inner margin at apex.

Redescribed from the female type of *couesii* (No. 1) in the Museum of Comparative Zoölogy at Cambridge.

Type localities.—Of *aureus*, Tuspan, Mexico; present location of type unknown to writer. Of *couesii*, Arizona (near Fort Whipple); type in Museum of Comparative Zoölogy.

DISTRIBUTION

ARIZONA: Seligman (H. F. Wickham). Near Fort Whipple (Dr. E. Coues).

MEXICO: Tuspan, Puebla (Sallé). Guanajuato (Sallé Dugès). Tupataro in Guanajuato (Höge).

NEW MEXICO: Santa Fé (A. Fenyes, Cockerell). Jemez Springs (J. Woodgate). Albuquerque (C. Schaeffer). Fort Wingate, September (Leng Collection). Jemez Mountains, 7,500 feet (H. Wenzel).

Variations.—This species shows very little variation, but occasionally a specimen is found that is slightly cupreous, and the prehumeral carina is more or less variable. Length 9 to 11 millimeters.

Host.—The larval habits are unknown, but the adults have been collected on *Mentzelia nuda* Gorry and Gray, by T. D. A. Cockerell.

Chamberlin (1926) gives the type locality of *couesii* as Santa Fé, New Mexico, but LeConte (1866) described the species from a single example collected near Fort Whipple, Arizona, by Dr. E. Coues. *Agrilus perlucidus* Gory from Mexico was supposed to be the same as *aureus* Chevrolat, but it is a valid species and should not be confused with *aureus*.

54. AGRILUS CONCINNUS Horn

Figure 38

Agrilus concinnus HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 310-311.—BLATCHLEY, Canad. Ent., vol. 52, 1920, p. 262.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 57.

Male.—Form large, robust, not strongly attenuate posteriorly, but rather strongly flattened above; head cupreous, and more or less bronzy; pronotum cupreous, margined laterally bronzy green, the median depression black, and on each side of which the surface is strongly reddish; elytra dull olivaceous bronze or black, with a bronzy green vitta extending from the humeral angle to apex; beneath brownish black, with a more or less olivaceous and aeneous reflection, and more shining than above.

Head with the front rather wide, top and bottom about equal in width, lateral margins nearly parallel to each other, a broad, shallow, longitudinal depression on anterior half, a broad, shallow, triangular depression slightly above the middle of front, extending to the lateral margins and obliquely backward to the occiput, and in the middle of which is a narrow, longitudinal groove; surface coarsely, irregularly punctate on the front, becoming strongly rugose on the occiput, but without conspicuous pubescence; epistoma transverse between the antennae, and broadly, rather deeply, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fourth joint, and the outer joints wider than long; eyes moderately large, rather broadly oblong, and about equally rounded beneath and above.

Pronotum one-third wider than long, wider at base than apex, and widest at apical third; sides feebly, obliquely expanded from base to apical third, then arcuately narrowed to the apical angles; when viewed from the side the marginal carina is feebly sinuate, the submarginal carina obsolete anteriorly, narrowly separated from the marginal carina, and connected to it at the base; anterior margin strongly emarginate, with the median lobe feebly, broadly rounded; base transversely truncate to middle of each elytron, then extending obliquely backward to the scutellum, in front of which it is broadly subtruncate; disk moderately convex, with a deep median depression, wider behind than in front, and extending from base to apex, a rather shallow, broad depression on each side along lateral margin at middle, a round, deep, pitlike puncture on each side along base near posterior angles, and without prehumeral carinae; surface densely, transversely rugose, densely, coarsely punctate between the rugae, the punctures becoming much finer at the sides, where the surface is densely clothed with recumbent, yellowish pubescence. Scutellum not transversely carinate, but the surface, finely, obsoletely reticulate.

Elytra slightly wider than pronotum at base, and slightly wider at base than just behind the middle; sides feebly, arcuately rounded for a short distance behind the base, broadly, arcuately constricted in front of middle, broadly expanded behind the middle, then arcuately narrowed to the tips, which are separately, rather broadly rounded, and minutely serrulate; sides of abdomen broadly exposed above; disk feebly flattened, vaguely, longitudinally depressed on each side of the suture, which is elevated posteriorly, and with broad, shallow basal depressions; surface densely, finely imbricate-punctate, the punctures becoming finer and more confluent toward the apex, and without distinct pubescence.

Abdomen beneath finely, densely punctate, transversely rugose on basal segment, sparsely clothed with very short, indistinct hairs, with a few long yellow hairs at apex; first segment convex at middle, without a median groove; last segment broadly rounded or subtruncate at apex, with a deep, marginal groove, which is not interrupted at apex; vertical portions of segments densely clothed with long, recumbent, yellowish pubescence; pygidium not carinate. Prosternum coarsely, confluently punctate, and without distinct pubescence; prosternal lobe broad, strongly declivous, with a deep, transverse groove behind, and rather deeply, arcuately emarginate in front; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is rather acute. Tibiae slender, nearly straight; anterior and middle pairs with a distinct tooth at apex, and the posterior pair feebly flattened. Posterior tarsi slightly shorter than the tibiae, and the first joint about as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth long and acute at tip, the inner one much shorter and broader, and not turned inward.

Length, 13 mm.; width, 3.5 mm.

Female.—Differs from the male in being slightly more robust; eyes more narrowly oblong; last abdominal segment with a more or less triangular smooth space at apex, sometimes interrupting the marginal groove, the posterior tibiae more broadly flattened and abruptly narrowed near apex, and none of the tibiae armed with a distinct tooth at apex.

Redescribed from the male and female cotypes (No. 3482) in the Academy of Natural Sciences of Philadelphia.

Type locality.—Florida.

DISTRIBUTION

Material examined:

ARKANSAS: No definite locality (H. Soltau collection).
FLORIDA: Jacksonville, May. Dunedin, April 11 (Blatchley).

Also recorded from:

GEORGIA: No definite locality.
TEXAS: Brownsville, June (Schaeffer collection).

Variations.—Very few specimens have been seen, and no variation worthy of mention has been observed.

Host.—The larval habits are unknown, but an adult has been swept from low huckleberry bushes by W. S. Blatchley.

Nearly all of the specimens examined are from Florida, and the specimen labeled "Ark." in the United States National Museum may be erroneously labeled. Horn (1891) in his original description gives Georgia, but I was unable to find any specimens from that locality in either the Horn or LeConte collections. Chamberlin (1926) records it from Texas, but the specimen has not been examined by the writer.

55. AGRILUS RESTRICTUS Waterhouse

Figure 40

Agrilus restrictus WATERHOUSE, Biol. Centr.-Amer., Coleop., vol. 3, pt. 1, 1889, p. 119, pl. 7, figs. 7, 7*a*.—FISHER and NICOLAY, Ent. News, vol. 31, 1920, pp. 100–102.—NICOLAY, Journ. N. Y. Ent. Soc., vol. 29, 1921, p. 175.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 79.

Male.—Form elongate, rather slender, and moderately flattened above; head, pronotum, and beneath bronzy green; elytra blackish, with a distinct purplish tinge.

Head with the front rather narrow, about equal in width at top and bottom, the lateral margins nearly parallel to each other, and with a broad, deep depression extending from the occiput to epistoma, the depression becoming triangular behind the epistoma; surface somewhat rugose, densely, coarsely punctate, the punctures more or less confluent, and sparsely clothed with semierect, inconspicuous hairs; epistoma not transverse between the antennae, and very broadly, deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes moderately large, broadly oblong, and about equally rounded above and beneath.

Pronotum nearly one-half wider than long, equal in width at base and apex, and widest near the middle; sides slightly arcuately rounded; when viewed from the side the marginal and submarginal carinae are feebly sinuate, narrowly separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate, and the median lobe strongly rounded; base transversely truncate to middle of each elytron, with the median lobe feebly produced and broadly rounded; disk moderately convex, with a broad, deep median depression extending from near anterior margin to base, and considerably broader behind than in front, a broad, deep depression on each side extending from the lateral margin at apical third obliquely backward to the middle, without prehumeral carinae, which are replaced at the posterior angles by a round swelling, with a round fovea behind it close to the base; surface irregularly rugose, and rather coarsely, irregularly punctate between the rugae. Scutellum not transversely carinate, but the surface deeply impressed at the middle, and finely reticulate.

Elytra about as wide as pronotum at base, and slightly wider at base than behind the middle; sides nearly parallel for a short distance behind base, feebly, broadly constricted in front of middle, feebly, broadly expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather narrowly rounded, and finely serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, with a vague costa extending from the humerus to near apex, feebly, longitudinally depressed on each side of the suture, which is strongly elevated posteriorly, and with broad, moderately deep basal depressions; surface rather finely, densely imbricate-punctate, and without distinct pubescence.

Abdomen beneath finely, sparsely punctate at the middle, becoming densely punctate and transversely rugose at the sides, and sparsely clothed with short, inconspicuous hairs; first segment convex at middle, and without a median groove; last segment broadly rounded at apex; vertical portions of the segments sparsely but not conspicuously clothed with long, whitish hairs; pygidium longitudinally carinate anteriorly, but the carina not projecting. Prosternum sparsely, coarsely punctate, and sparsely clothed with very short, inconspicuous hairs; prosternal lobe broad, strongly declivous, and broadly, deeply, arcuately emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is rounded. Tibiae slender, the anterior and middle pairs feebly arcuate, and armed with a short tooth on the inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broader and shorter than the outer one, and not turned inward.

Length, 8.5 mm.; width, 2.25 mm.

Female.—Differs from the male as follows: More robust, head, pronotum, and beneath cyaneous, elytra reddish cupreous, antennae shorter, extending slightly beyond anterior margin of pronotum, and the outer joints wider than long, eyes more elongate, abdomen more broadly exposed above, and the tibiae unarmed at apex.

Length, 10 mm.; width, 2.75 mm.

Redescribed from a pair taken in coitu in the Huachuca Mountains, Ariz., August 2, 1905, and in the collection of Alan S. Nicolay.

Type locality.—Pinos Altos, State of Chihuahua, Mexico.

DISTRIBUTION

ARIZONA: Huachuca Mountains, August 2, 1905 (Nicolay collection), Carr Canyon, Conchise County, Huachuca Mountains, August 1905 (H. Skinner).

MEXICO: Type locality.

Variations.—No variation was observed in the three examples (two males and one female) examined. The male specimen in the Nicolay collection is abnormal, and has joints six and seven of both antennae connate.

Host.—Unknown.

This species is remarkable for its sexual color dimorphism, which, so far as known, is only found in one other North American species (*walsinghami* Crotch). The species is allied to *concinnus* Horn, but can be easily separated from that species by the different coloration of the sexes, sides of the pronotum not pubescent, and by numerous other characters.

56. AGRILUS WALSINGHAMI Crotch

Figure 39

Agrilus walsinghami CROTCH, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, pp. 95–96.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 311–312, pl. 8, figs. 6, 20; Ent. News, vol. 2, 1891, p. 147; Proc. Calif. Acad. Sci. ser. 2, vol. 4, 1894, p. 379.—FALL, Calif. Acad. Sci., Occasional Papers, no. 8, 1901, p. 120; Canad. Ent., vol. 37, 1905, p. 271; Ent. News, vol. 17, 1906, p. 168.—FALL and COCKERELL, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 180.—WOODWORTH, Guide to California Insects, 1913, p. 195.—CHAMBERLIN, Ent. News, vol. 28, 1917, p. 169.—VAN DYKE, Ann. Ent. Soc. Amer., vol. 12, 1919, p. 10.—CHAMBERLIN, Journ. N. Y. Ent. Soc., vol. 32, for 1924 (1925), p. 194; Cat. Buprestidae, 1926, p. 86.

Male.—Form moderately elongate, subcylindrical, not strongly narrowed posteriorly, feebly flattened above, and feebly shining; head and pronotum bronzy brown, with a feeble cupreous reflecttion; elytra aeneous, slightly purplish, and more cupreous near base; beneath brownish black anteriorly, strongly bronzy green on abdomen, and the legs more or less cupreous.

Head with the front rather wide, distinctly wider at top than at bottom, the lateral margins obliquely expanded from bottom to top, and with a deep, triangular depression on the front with its base along the epistoma, and a narrow, longitudinal groove extending from the depression to occiput; surface coarsely, densely punctate, the punctures more or less confluent, and sparsely clothed with long, recumbent, yellowish white hairs; epistoma not transverse between the antennae, strongly elevated, and broadly, deeply, arcuately emarginate in front; antennae not extending to middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes moderately large, broadly oblong, and slightly more broadly rounded beneath than above.

Pronotum one-third wider than long, about equal in width at base and apex, and widest at middle; sides feebly, arcuately rounded from apical angles to base; when viewed from the side the marginal and submarginal carinae are feebly sinuate, not sharply defined, widely separated anteriorly, and connected to each other near the base, where they are more or less obliterated; anterior margin feebly sinuate, and the median lobe scarcely indicated; base strongly, angularly emarginate at middle of each elytron, and the median lobe broadly rounded in front of scutellum; disk rather strongly convex, with a broad, vague median depression extending from base to apex, a broad, shallow, oblique depression on each side along lateral margin at middle, and with a broadly rounded elevation replacing the prehumeral carina; surface coarsely, densely punctate, the punctures more widely and irregularly separated on each side of the median depression, and sparsely clothed with short, recumbent, whitish hairs, which are denser and longer in the median and lateral depressions. Scutellum not distinctly carinate, but the surface finely, densely reticulate.

Elytra about equal in width to pronotum at base, and distinctly wider at base than just behind the middle; sides slightly expanded for a short distance behind base, feebly narrowed to behind the middle, where they are obsoletely, arcuately expanded, then arcuately narrowed to the tips, which are separately, narrowly rounded, and feebly serrulate; sides of abdomen broadly exposed above; disk feebly flattened, with broad deep basal depressions, and each elytron with three fine, irregular, vague costae extending to near the apex, one along the suture, and two on disk; surface densely, finely imbricate-punctate, sparsely clothed with short, inconspicuous hairs, and each elytron ornamented with feebly indicated, white pubescent spots as follows: One in basal depression, one in front of middle between the two discal costae, one at the middle between costa and lateral margin, and one at apical fourth near the sutural margin.

Abdomen beneath coarsely punctate, the punctures sparse on median parts, but more or less confluent and transversely rugose on basal segments, and segments two to five with a large whitish pubescent spot at sides, placed transversely along anterior margin of segments; first segment strongly convex, and without a median depression; last segment broadly rounded at apex; suture between first and second segments distinct at the side; vertical portions of segments with a spot of long, dense, whitish pubescence; pygidium coarsely punctate, strongly carinate, but the carina not projecting. Prosternum coarsely, sparsely punctate, and very sparsely clothed with long, semierect, whitish hairs; prosternal lobe broad, strongly declivous, and broadly, deeply, arcuately emarginate in front; prosternal process broad, and the sides parallel to near the apex, which is broadly rounded. Tibiae slender, the anterior and middle pairs slightly arcuate, and all pairs armed with a distinct tooth on inner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint about as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Length, 12 mm.; width, 3 mm.

Female.—Differs from the male in being larger and more robust, uniformly greenish blue above; front of head broader; eyes more broadly oblong; costae and pubescent spots on elytra more distinct; tibiae with a shorter tooth at apex, and the tarsal claws more feebly cleft.

Length, 13 mm.; width, 3 mm.

Redescribed from the male and female cotypes in the LeConte collection in the Museum of Comparative Zoölogy.

Type localities.—Oregon (LeConte collection); California (Horn collection).

DISTRIBUTION

Material examined:

ARIZONA: Winslow, July 18 (H. F. Wickham). Huachuca Mountains, July 28 (J. S. Hine).
BRITISH COLUMBIA: Osoyoos Valley, August 12 (E. Hearle).
CALIFORNIA: Yreka (——). Independence, July 17 (H. F. Wickham). Siskiyou and Inyo Counties (E. Van Dyke). No definite locality, cotypes (Horn).
IDAHO: Boise City (L. Bruner).
NEVADA: Carson City, July 30 (H. F. Wickham).
NEW MEXICO: Jemez Springs, August 6 (J. Woodgate). Luna (H. F. Wickham). Santa Fe, August; Tseque (A. Fenyes).
OREGON: Josephine County (——). No definite locality, cotype (Walsingham).
UTAH: Vineyard, August 29 (Tom Spalding) St. George, July (H. F. Wickham).
It is also recorded by Horn (1891) from Texas in the Seeber collection (probably incorrectly labeled).

Variations.—This species shows a remarkable sexual color dimorphism which has been overlooked by all the older writers. The median depression on the pronotum is sometimes nearly obliterated, and is never very deep as in *cavatus*, and the lateral depressions are sometimes feebly impressed from near the apical angles to the base on the inner side of the prehumeral elevation. In some examples the tips of the elytra are more acutely rounded than in others, and the pubescent spots are more or less abraded. Length 9 to 13 millimeters.

Host.—Unknown.

Crotch states in the original description that the scutellum is carinate, but I have not seen any examples in which the scutellum could be considered as carinate. Horn (1891) writes that the tibiae of the females are unarmed at the apex, but in reality they have a very minute tooth at the apex, which varies more or less in length. Chamberlin (1917) gives the type locality as Yreka, Calif., but the male and female cotypes No. 5080 in the LeConte collection are simply labeled "Or." and the male cotype No. 2714 in the Horn collection is labeled "Cal.," so there seems to be no definite type locality.

57. AGRILUS INHABILIS Kerremans

Agrilus inceptus HORN, Proc. Calif. Acad. Sci., ser. 2, vol. 4, 1894, pp. 378–379 (name preoccupied).—SCHAEFFER, Journ. N. Y. Ent. Soc., vol. 12. 1904, p. 211.

Agrilus inhabilis KERREMANS, Ann. Soc. Ent. Belgique, vol. 44, 1900, p. 341.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 66.

Female.—Form similar to *pulchellus*, feebly shining, bluish green, with a more or less violaceous reflection in certain lights; beneath bluish green, becoming more violaceous blue on the abdomen.

Head with the front not very wide, about equal in width at top and bottom, lateral margins very feebly, arcuately expanded near bottom, mouth inferior, and with a broad, deep depression extending from vertex to epistoma; surface rather densely, coarsely rugose. the rugae more or less irregularly placed, coarsely punctate between the rugae, and with a spot of long, whitish pubescence behind the epistoma; epistoma very narrow between the antennae and broadly but not deeply, arcuately emarginate in front, the exterior angles rectangular; antennae short, compact, extending scarcely beyond anterior margin of pronotum, serrate from the fourth joint, and the outer joints much wider than long; eyes large, and equally rounded above and beneath.

Pronotum slightly wider than long, narrower at apex than at base, and widest along basal half; sides arcuately expanded from apical angles to middle, then parallel or feebly sinuate to the posterior angles, which are rather acute and feebly projecting; when viewed from the side the marginal carina is sharply defined and straight, the submarginal carina feebly arcuate, and becoming obsolete near the base, the two carinae rather widely separated and nearly parallel to each other anteriorly; anterior margin feebly sinuate, with the median lobe feebly, broadly rounded; base feebly, broadly, arcuately emgarinate at middle of each elytron, the median lobe broadly rounded, and truncate in front of scutellum; disk moderately convex, with two shallow median depressions, a very broad, irregular, shallow depression on each side along lateral margin, with four deep, round, pitlike punctures along base, two in front of scutellum, and one on each side near the elytral lobe, and with a rather long, obtuse, feebly indicated elevation in place of the prehumeral carina; surface coarsely, deeply, densely rugose, the rugae more or less transverse on the disk, becoming irregular toward the sides, and with numerous punctures between the rugae. Scutellum not transversely carinate, but the surface more or less irregularly rugose.

Elytra scarcely as wide as pronotum at base, and wider at base than behind middle; sides nearly parallel for a short distance behind the base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then arcuately narrowed to the tips, which are separately, narrowly rounded, and finely serrulate; sides of abdomen very broadly exposed above; disk feebly flattened, without longitudinal costae, the sutural margins scarcely elevated posteriorly, but with broad, deep basal depressions; surface rather finely, densely imbricate-punctate, becoming feebly, transversely rugose in the humeral regions.

Abdomen beneath obsoletely granulose, finely, rather densely punctate, the punctures connected transversely by sinuate lines, which are coarser on the basal segments, sparsely clothed with short, recumbent, inconspicuous hairs, and with a small spot of long, dense, recumbent hairs at the sides of the anterior margin of the segments; first and second segments convex at middle, and the suture between the two segments plainly visible at the sides; last segment broadly rounded at apex; vertical portions of the segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, with a strongly elevated carina, which is not distinctly projecting. Prosternum densely granulose, sparsely, coarsely punctate, feebly rugose, and sparsely clothed with long, semierect, white hairs; prosternal lobe broad, rather strongly declivous, and broadly transversely truncate in front; prosternal process board, the sides feebly expanded behind the coxal cavities, then strongly narrowed to the apex, which is acute. Tibiae slender and unarmed at apex. Posterior tarsi much shorter than tibiae, and the first joint about as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth slightly shorter than outer one, and feebly turned inward.

Length, 9.5 mm.; width, 2.5 mm.

Male.—Unknown.

Redescribed from the lectotype No. 3483 in the Philadelphia Academy of Natural Sciences.

Type locality.—"Lower California (Coral de Piedra, Sierra El Taste, and Pescadero.)"

Host.—Unknown.

According to the localities given in the original description, Horn had at least three specimens before him when he described this species, all of which were from the cape region of Lower California. The writer has only seen one example of this species, and that is the specimen labeled "lectotype 3483" in the Horn collection, but that specimen is simply labeled with a round orange disk, and without any locality label.

This species is very closely allied to *pulchellus* Bland in structural characters, and in case the genus *Engyaulus* is separated from *Agrilus*, *inhabilis* should be placed in the former genus. It can, however, be easily separated from *pulchellus* by having the elytra of a uniformly bluish-green color, and without the pubescent vittae.

58. AGRILUS SNOWI Fall

Agrilus snowi FALL, Canad. Ent., vol. 37, 1905, pp. 270–271.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 82.

Male.—Form rather short, very robust, slightly convex above, and feebly shining; head and pronotum black, with a vague aeneous or greenish tinge; elytra black, with a feeble bluish or purplish reflection in certain lights; beneath black, with a distinct aeneous tinge.

Head with the front wide, nearly flat, wider at top than bottom, the lateral margins feebly, obliquely expanded from bottom to top, and with a vague, longitudinal, concave depression on the front and vertex; surface finely granulose, coarsely, densely punctate, and densely clothed with long, recumbent, white hairs; epistoma transverse between the antennal cavities, not elevated, and broadly, deeply, arcuately emarginate in front; antennae extending slightly beyond anterior margin of pronotum, serrate from the fourth joint, and the outer joints slightly wider than long; eyes large, rather broadly oblong, and about equally rounded above and beneath.

Pronotum nearly one-half wider than long, narrower at apex than base, and widest at basal third; sides feebly obliquely expanded from posterior angles to basal third, then obliquely narrowed to the apical angles; when viewed from the side the marginal and submarginal carinae are nearly straight, and rather broadly, equally separated for their entire length; anterior margin slightly sinuate, and the median lobe broadly, vaguely rounded; base deeply, abruptly emarginate at middle of each elytron, the median lobe broadly rounded, and truncate or feebly emarginate in front of scutellum; disk strongly, uniformly convex, without depressions, but with long, rather distinct prehumeral carinae; surface densely, finely granulose, finely, sparsely punctate, vaguely, transversely rugose at middle, becoming more strongly, obliquely rugose toward the sides, and rather densely clothed with long, recumbent, white hairs. Scutellum not transversely carinate, but the surface finely, densely reticulate.

Elytra about as wide as pronotum at base, and slightly wider at base than behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted at middle, strongly, broadly expanded behind the middle, then arcuately narrowed to the tips, which are separately, narrowly rounded, and finely serrulate; sides of abdomen very broadly exposed above; disk evenly convex, without any indications of costa, but with broad, moderately deep basal depressions; surface rather coarsely, densely imbricate-punctate, and sparsely, uniformly clothed with short, recumbent, white hairs.

Abdomen beneath finely, densely granulose, finely, densely punctate, and densely clothed with long, recumbent white hairs and efflorescence, nearly concealing the surface; first segment slightly flattened at middle; last segment broadly rounded at apex, and the margin feebly serrate; suture between first and second segments visible from side to side; lateral margin of first segment abruptly interrupted posteriorly, and not continuing on the same line with the lateral margin of the second segment; vertical portions of segments densely clothed with long, recumbent, white hairs and efflorescence; pygidium without a projecting carina. Prosternum rather coarsely rugose, and densely clothed with long, recumbent, white pubescence and efflorescence; prosternal lobe broad, strongly declivous, and feebly, arcuately rounded or subtruncate in front; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then broadly rounded to the apex. Tibiae slender, anterior pair feebly arcuate, and the anterior and middle pairs armed with a short, thick tooth on inner margin at apex. Posterior tarsi shorter than tibiae and the first joint as long as the following two joints united. Tarsal claws nearly similar on all feet, cleft near the tip, the inner tooth slightly shorter than outer one, and not turned inward. Genitalia not examined.

Length, 9.5 mm.; width, 3 mm.

Female.—Similar to the male, but is slightly more robust; prosternum sparsely clothed with long, recumbent, whitish pubescence; abdomen more broadly exposed above; anterior and middle tibiae armed with a very short tooth at apex, and the tarsal claws cleft closer to the middle than in the male.

Length, 10.25 mm.; width, 4 mm.

Redescribed from the male holotype in the Snow collection in the University of Kansas.

Type locality.—Bill Williams Fork, Ariz.

DISTRIBUTION

Material examined:

ARIZONA: Bill Williams Fork (F. H. Snow). Tempe, October 18, 1911 (E. G. Smyth).

Variation.—No variation worthy of note has been observed in the few specimens examined.

Host.—Unknown.

This is one of the most robust species of this genus, and in this respect resembles some of the *Acmaeodera*, and seems to be very rare. Only three examples have been seen by the writer, the holotype in the University of Kansas collection and two females from Tempe, Ariz., in the collections of F. H. Fall and Warren Knaus.

59. AGRILUS COSTIPENNIS, new species

Figure 41

Male.—Form resembling that of *walsinghami* Crotch, and uniformly bronzy brown, with a more or less cupreous tinge.

Head with the front rather wide, feebly convex, lateral margins nearly parallel from top to bottom, broadly, but not deeply concave in front, and with a feeble narrow, longitudinal groove on the occiput; surface coarsely, densely, punctate, somewhat rugose, and rather densely, uniformly clothed with moderately long, semierect, whitish hairs; epistoma slightly transverse between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending nearly to middle of pronotum, serrate from the fourth joint, and the outer joints slightly longer than wide; eyes large, broadly oblong, and about equally rounded above and beneath.

Pronotum nearly one-third wider than long, about equal in width at base and apical third, and the apex slightly narrower than base; sides arcuately expanded from apical angles to apical third, then nearly parallel or feebly sinuate to the posterior angles, which are acute, and projecting slightly outward; when viewed from the side the marginal carina is strongly sinuate, and bent downward near the base, the submarginal carina straight, the two carinae widely separated anteriorly, and connected to each other at the base; anterior margin feebly sinuate, and the median lobe scarcély developed; base feebly, arcuately emarginate from the posterior angles to scutellum, in front of which it is broadly subtruncate; disk moderately convex, with a broad, shallow median depression, which is indistinct anteriorly, but more deeply depressed in front of the scutellum, a rather deep, oblique depression on each side along lateral margin at middle, and with a broad elevation replacing the prehumeral carnia; surface coarsely, but not very closely punctate on median part, becoming rugose toward the sides, and rather densely, uniformly clothed with rather long, semierect, whitish hairs. Scutellum not transversely carinate, but the surface finely, densely reticulate.

Elytra about equal in width to the pronotum at base, and slightly wider at base than just behind the middle; sides slightly, arcuately expanded behind the base, broadly, arcuately constricted in front of middle, feebly expanded behind the middle, then arcuately narrowed to the tips, which are separately, narrowly rounded, and minutely, serrulate; sides of abdomen narrowly exposed above; disk slightly convex, basal depressions broad and shallow, and each elytron with three fine, irregular, vague costae extending from near base to behind the middle, one along the suture and two on the disk; surface finely, densely punctate, more or less imbricate, and rather densely, uniformly clothed with short, recumbent, whitish hairs, except on the costae.

Abdomen beneath rather densely, finely punctate, the punctures more distant at the middle, somewhat transversely rugose on basal segment, and rather densely clothed with short, recumbent, white hairs; first segment strongly convex, without a median groove; last segment broadly rounded and strongly serrulate at apex; suture between first and second segments distinctly indicated at the sides; vertical portions of the segments with slightly denser whitish pubescence; pygidium coarsely, sparsely punctate, and feebly carinate, but the carina not projecting. Prosternum coarsely, densely, punctate, sparsely clothed with long, semierect, whitish hairs, and with a feeble, longitudinal depression at middle; prosternal lobe broad, strongly declivous, broadly, arcuately emarginate in front, and forming a rounded lobe on each side of the emargination; prosternal process broad, the sides parallel to behind the coxal cavities, then broadly rounded to the apex, which is acute. Tibiae slender, the anterior pair slightly arcuate, and the anterior and middle pairs armed with a short tooth on the inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint about as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than the outer one, and not turned inward.

Length, 8.25 mm.; width, 2.4 mm.

Female.—Unknown.

Type locality.—Pasadena, Calif.

Other localities.—Los Angeles, Calif.

Type.—Cat. No. 40999, U.S.N.M.

Paratype.—In collection of J. N. Knull.

Described from two males, the type collected at the type locality, July 27, 1901, by C. H. Merriam, and the paratype labeled "Los Angeles, Calif."

This species is allied to *walsinghami* Crotch, but it can be at once separated from that species by the coloration and absence of pubescent spots on the elytra.

60. AGRILUS BABOQUIVARIAE, new species

Figure 42

Male.—Form similar to that of *costipennis* Fisher, and uniformly bronzy brown, with a more or less cupreous tinge.

Head with the front rather wide, feebly convex, the lateral margins nearly parallel to each other, broadly, but not deeply, concave in front, and with a feeble, narrow, longitudinal groove on the occiput; surface coarsely, sparsely punctate, coarsely rugose, and sparsely clothed with long, recumbent, white hairs; epistoma about as wide as long, and broadly, deeply, arcuately emarginate in front; antennae extending nearly to middle of pronotum, serrate from the fourth joint, and the outer joints slightly longer than wide; eyes large, broadly oblong, and about equally rounded above and beneath.

Pronotum as long as wide, slightly narrower at base than apex, and widest near apical angles; sides feebly obliquely narrowed from apical angles to near the base, where they are vaguely sinuate; posterior angles rectangular; when viewed from the side the marginal carina is feebly sinuate, the submarginal carina nearly straight, and the two carinae narrowly separated for their entire length; anterior margin strongly sinuate, with the median lobe strongly, broadly rounded; base feebly emarginate at middle of each elytron, with the median lobe broadly rounded and subtruncate in front of scutellum; disk moderately convex, with a broad, shallow median depression extending from the anterior margin to base, a broad, shallow depression on each side, extending obliquely backward from the lateral margin at middle to the base, and with a broad elevation replacing the prehumeral carina; surface coarsely, sparsely punctate, more or less rugose toward the sides, and rather densely, uniformly clothed with long, recumbent, white hairs. Scutellum not transversely carinate, but the surface finely, vaguely reticulate.

Elytra about as wide as pronotum at base, and equal in width at base and behind middle; sides nearly parallel to apical third (very broadly, feebly constricted in front of middle), then obliquely narrowed to the tips, which are separately, rather narrowly rounded, and feebly serrulate; sides of abdomen narrowly exposed above; disk slightly convex, the basal depressions broad and shallow, sutural margins slightly elevated posteriorly, and each elytron with three smooth vague costae, extending from base to behind the middle, one along the sutural margin, and two on the disk; surface rather coarsely imbricate-punctate, slightly rugose near base, and rather densely, uniformly clothed (except on costae) with short, recumbent, white hairs.

Abdomen beneath sparsely, finely punctate at middle, punctures denser toward sides where the surface is transversely rugose, and rather densely clothed with moderately long, recumbent, white hairs; first segment strongly convex and without a median groove; last segment broadly rounded and strongly serrulate at apex; vertical portions of the segments not conspicuously pubescent; suture between first and second segments distinctly indicated at the sides; pygidium distinctly longitudinally carinate, but the carina not projecting. Prosternum sparsely, finely punctate, and densely clothed with long, fine, erect hairs; prosternal lobe broad, strongly declivous, broadly and rather deeply, arcuately emarginate in front, and forming a rounded lobe on each side of the emargination; prosternal process broad, slightly concave, and the sides parallel to behind the coxal cavities, then abruptly narrowed to the apex, which is rather acute. Tibiae slender, the anterior pair slightly arcuate, and the anterior and middle pairs armed with a short tooth on the inner margin at apex. Posterior tarsi as long as the tibiae, and the first joint equal in length to the following joints united. Tarsal claws nearly similar on all feet, cleft near the middle (the anterior pair slightly closer to apex), the inner tooth broader and slightly shorter than outer one, and not turned inward.

Length, 7.75 mm.; width, 1.75 mm.

Female.—Differs from the male in being more robust and the abdomen more broadly exposed above; front of head broader; prosternum clothed with short recumbent, white hairs; prosternal process not concave; tibiae unarmed at apex, and the tarsal claws cleft closer to the middle with the inner tooth distinctly shorter than the outer one.

Length, 8.25 mm.; width, 2.125 mm.

Type locality.—Arizona (male type); Baboquivaria Mountains, Arizona (female).

Type.—Cat. No. 41000, U.S.N.M.

Allotype.—University of Kansas.

Described from two examples, the male labeled simply "Ari." without a definite locality, and the female collected in the Baboquivaria Mountains by F. H. Snow. In the female the pubescence on the pronotum is slightly shorter than in the type, but otherwise the differences are only sexual.

This species is very closely allied to *costipennis* Fisher, but can be readily separated from that species by the pronotum being not wider than long, the pygidium distinctly carinate, and the posterior tarsi as long as the tibiae, with the first joint as long as the following joints united.

61. AGRILUS HUACHUCAE Schaeffer

Figure 43

Agrilus huachucae SCHAEFFER, Bull. Brooklyn Inst. Mus., vol. 1, no. 7, 1905, p. 150.—FROST and WEISS, Canad. Ent., vol. 53, 1921, p. 72.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 65.

Male.—Form rather large, robust, slightly flattened above, and moderately shining; head bronzy green, with a golden tinge behind the epistoma and in median depression, and becoming reddish purple on front, vertex and occiput; pronotum reddish purple, with a distinct greenish reflection; elytra black, with a bluish or greenish tinge in certain lights; beneath brown, with a distinct aeneous or aeneo-cupreous tinge, especially anteriorly.

Head with the front rather narrow, about equal in width at top and bottom, the lateral margins parallel to each other, and with a deep, broad depression extending from occiput to epistoma, the depression narrower on the occiput, but becoming broader toward the epistoma, where it is deeply depressed, and with a smooth, narrow, longitudinal groove in bottom of depression on occiput; surface coarsely, densely punctate, more or less rugose, and sparsely clothed with short, inconspicuous hairs; epistoma not transverse between the antennae, strongly elevated, and feebly, broadly, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints wider than long; eyes moderately large, rather narrowly oblong, and about equally rounded beneath and above.

Pronotum about two-fifths wider than long, slightly wider at base than apex, and widest at middle; sides regularly, arcuately rounded from apical angles to posterior angles, which are rectangular; when viewed from the side the marginal carina is slightly sinuate, the submarginal carina nearly straight, the two carinae rather narrowly separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base nearly transverse to middle of each elytron, then broadly, strongly rounded to the scutellum; disk moderately convex, broadly, feebly depressed along basal half, with a deep, arcuate depression extending from lateral margin at middle to base, and enveloping a large, round elevation near posterior angles, which replace the prehumeral carinae; surface deeply, closely rugose, the rugae transverse near base at middle, but becoming oblique at sides and near apex, and coarsely punctate between the rugae. Scutellum deeply depressed at middle, but not transversely carinate.

Elytra about as wide as pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and strongly serrulate; sides of abdomen only vaguely exposed above; disk slightly flattened, without distinct longitudinal costa, sutural margins slightly elevated posteriorly, and with broad, moderately deep basal depressions; surface densely, finely granulate-punctate, and sparsely clothed with very short, inconspicuous hairs.

Abdomen beneath obsoletely granulose, rather densely, finely punctate, transversely rugose at sides of basal segment, and sparsely, uniformly clothed with very short, recumbent, white hairs; first segment convex at middle; last segment broadly rounded or subtruncate at apex; vertical portions of segments not conspicuously pubescent; pygidium densely punctate, strongly carinate anteriorly, but the carina not projecting. Prosternum sparsely, coarsely punctate, and sparsely clothed with short, recumbent, white hairs; prosternal lobe broad, strongly declivous, and broadly but not very deeply, arcuately emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, the anterior pair slightly arcuate, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint about as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, much shorter than outer one, and not turned inward.

Length, 8.5 mm.; width, 2.25 mm.

Female.—Similar to the male, but differs from it in having the front of head wider, more uniformly reddish purple, and the tibiae not armed with a tooth on inner margin at apex.

Redescribed from the male cotype, No. 2 in the collection of the Brooklyn Institute Museum.

Type locality.—Ramsey Cañon, Huachuca Mountains, Ariz.

DISTRIBUTION

ARIZONA: Ramsey Cañon, Huachuca Mountains, August 13; Palmerly, Cochise County, August 2 (Charles Schaeffer). Schaeffer Cañon, Baboquivari Mountains, 5,160–5,500 feet, September 18, 1924 (J. A. G. Rehn and M. Hebard).

Variations.—Scarcely any variation was observed in the few specimens examined, except in size, which varies from 7 to 9 millimeters in length, but frequently the under side of the body is black, with a bluish tinge, and strongly shining, and the pubescence on elytra sometimes more distinct than in others.

Host.—The larval habits are not known, but Charles Schaeffer has collected the adults on oak (*Quercus* sp.).

This species is allied to *restrictus* Waterhouse but can be separated from that species by the pronotum not being deeply depressed at the middle, the elytra uniformly clothed with short white hairs, and the sexes not differently colored.

62. AGRILUS VENTRALIS Horn

Agrilus ventralis HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 320–321, pl. 8, figs. 21–22.—FALL and COCKERELL, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 181.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 84.

Form small, subcylindrical, vaguely flattened above, moderately shining, uniformly dark brown, with a feebly cupreous or aeneous tinge, and each elytron ornamented with a more or less distinct pubescent vitta; beneath similar in color to above, but slightly more shining.

Head with the front rather wide, slightly convex, distinctly wider at top than at bottom, the lateral margins obliquely narrowed from top to bottom, and with a shallow median depression extending from the vertex to epistoma; surface sparsely, coarsely punctate, and without distinct pubescence; epistoma very narrow between the antennae, and nearly transversely truncate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes rather small, broadly oval, and slightly more acutely rounded beneath than above.

Pronotum vaguely wider than long, about equal in width at base and apex, and widest along middle; sides slightly rounded at apical angles, parallel to behind middle, then obliquely narrowed to the posterior angles; when viewed from the side the marginal and submarginal carinae are nearly straight, rather widely separated anteriorly, and connected to each other at the base; anterior margin feebly sinuate, with the median lobe feebly, broadly rounded; base feebly, arcuately emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk strongly convex, feebly, broadly, transversely concave along base, and without median or lateral depressions or prehumeral carinae; surface obsoletely granulose, finely rugose, the rugae widely separated, more or less transverse on disk but becoming oblique toward the sides, sparsely, finely punctate between the rugae, and clothed with a few inconspicuous hairs toward the sides, being a continuation of the elytral vittae. Scutellum not distinctly carinate, but the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and slightly narrower at base than behind middle; sides nearly parallel for a short distance behind base, broadly, feebly constricted in front of middle, rather strongly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and distinctly serrulate; sides of abdomen not exposed above; disk vaguely convex, sutural margins scarcely elevated posteriorly, and with broad, very shallow basal depressions; surface coarsely, roughly imbricate-punctate, and each elytron ornamented with a narrow subsutural, pubescent vitta extending from the basal depression to apex, and composed of sparsely placed, short, recumbent, whitish hairs.

Abdomen beneath finely, densely granulose, rather sparsely, finely punctate, the punctures more or less transversely connected by sinuate lines, becoming rugose at the sides of first two segments, and sparsely clothed with short, inconspicuous hairs, which are more distinct at sides of segments; first segment feebly convex and not pubescent at middle; last segment broadly rounded at apex; posterior margin of the second segment produced into a broadly arcuate lobe at middle, which is free and projecting over the third segment; third segment vaguely projected over the fourth at middle; vertical portions of the segments not conspicuously pubescent; pygidium without a projecting carina. Prosternum sparsely, finely punctate, and sparsely clothed with moderately long, semierect, whitish hairs; prosternal lobe broad, moderately declivous, and broadly but not deeply, arcuately emarginate in front, forming a rounded lobe on each side of the emargination; prosternal process rather narrow, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is rather acute. Tibiae slender, and without a distinct tooth on inner margin at apex. Posterior tarsi nearly as long as the tibiae, and the first joint nearly as long as the following three joints united. Tarsal claws similar on all feet, cleft near the base, the inner tooth broad and very short, and not turned inward. Genitalia not examined.

Length, 3.75 mm.; width, 1 mm.

Redescribed from the lectotype, No. 3487, in the Academy of Natural Sciences in Philadelphia.

Type locality.—New Mexico (no definite locality).

Variations.—No variation was observed in the two specimens examined, except that the paratype which is from the type locality is 4.25 millimeters in length.

Host.—Unknown.

The two examples, which are without doubt the same sex, are probably females, unless the peculiar abdominal lobe is a sexual character, in which case they would be males. In general appearance the species resembles *Taphrocerus agriloides*, and the disk of the pronotum is more or less sculptured as in some of the *Anthaxia*, but it can be separated from all other known North American species of this genus by the posterior margin of the second ventral segment of the abdomen being free and slightly projecting over the next segment. The four specimens in the Horn collection under this species, and labeled " Tex.," are not *ventralis*.

63. AGRILUS OBOLINUS LeConte

Figure 44

Agrilus obolinus LeConte, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 248.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 313–314 (part).—Fall, Calif. Acad. Sci., Occasional Papers, No. 8, 1901, p. 120 (probably *costipennis*).—Woodworth, Guide to California Insects, 1913, p. 195 (probably *costipennis*).—Chamberlin, Cat. Buprestidae, 1926, p. 72 (part).

Agrilus knausi Schaeffer, Bull. Brooklyn Inst. Mus., vol. 1, no. 15, 1909, pp. 376–377.—Fall, Trans. Amer. Ent. Soc., vol. 36, 1910, pp. 138–139.

Female.—Form rather robust, slightly flattened above, and rather strongly shining; above uniformly reddish cupreous, with a feeble aeneous tinge along the sutural margins of elytra; beneath more aeneo-cupreous and shining than above.

Head with the front rather wide, about equal in width at top and bottom, the lateral margins nearly parallel to each other, and with a deep, broad depression extending from occiput to epistoma, the depression narrower on the occiput, but becoming broader toward the epistoma, and with a narrow, longitudinal groove in bottom of depression extending from occiput to middle of front; surface coarsely but not very densely punctate, and sparsely clothed with short, recumbent, white hairs; epistoma strongly transverse between the antennae, slightly elevated, and broadly but not very deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints slightly wider than long; eyes large, rather broadly oblong, and equally rounded above and beneath.

Pronotum about one-third wider than long, about equal in width at base and apex, and widest at middle; sides arcuately rounded from apical angles to near the base, where they are strongly sinuate, and the posterior angles rectangular; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina nearly straight, the two carinae rather narrowly separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate, and the median lobe broadly rounded; base feebly, broadly emarginate at middle of each elytron, and with the median lobe very broadly rounded; disk moderately convex, with a broad, shallow median depression, which is broader posteriorly, a deep, arcuate depression extending from lateral margin at middle to base, and enveloping a large, round elevation near posterior angle, and an obsolete, obtuse prehumeral carina; surface sparsely, coarsely punctate, feebly rugose, the rugae transverse toward the base, and oblique at the sides, and sparsely clothed with short, recumbent, whitish hairs. Scutellum not transversely carinate, but the surface finely, densely reticulate.

Elytra wider than pronotum at base, and slightly wider at base than behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted in front of middle, feebly, broadly expanded behind middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and feebly serrulate; sides of abdomen feebly exposed above; disk slightly flattened, vaguely, longitudinally depressed along sutural margins, causing a very vague, obtuse costa on each elytron, sutural margins feebly elevated posteriorly, and with broad, deep basal depressions; surface feebly imbricate-punctate, and sparsely clothed with short, recumbent whitish hairs.

Abdomen beneath obsoletely granulose, finely punctate, sparsely at the middle, more densely at the sides, the punctures connected transversely by sinuate lines, which are coarser on the basal segment, and sparsely clothed with short, recumbent, whitish hairs; first segment convex at middle; last segment broadly rounded at apex; vertical portions of segments sparsely pubescent; pygidium densely, coarsely punctate, strongly carinate, but the carina not projecting. Prosternum coarsely, sparsely punctate, and clothed with a few recumbent, white hairs; prosternal lobe broad, feebly declivous, and very feebly, broadly emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, and without a tooth on inner margin at apex. Posterior tarsi shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Length, 8.25 mm.; width, 2.25 mm.

Male.—Differs from the female in having the front of head feebly expanded at the middle; anterior and middle tibiae armed with a short tooth on inner margin at apex, and the last abdominal segment emarginate at apex.

Redescribed from the female type (No. 1) in the Museum of Comparative Zoölogy.

Type localities.—Of *obolinus*, Kansas; type in Museum of Comparative Zoölogy. Of *knausi*, Belvidere, Kans.; type in the Museum of the Brooklyn Institute.

Distribution.—The only specimens examined, which could be considered as this species, are from the type localities and which have been distributed in various collections. From the material examined its range seems to be confined to Kansas.

Variations.—This species varies in color from a bronzy green, with a slightly cupreous tinge, to reddish or brownish cupreous, the median depression on pronotum varies more or less in depth, the prehumeral carinae are usually vaguely indicated, but sometimes the carinae are replaced by round elevations, and in nearly all of the examples examined the prosternal lobe is more deeply emarginate in front than in the type.

Host.—The larval habits are not known, but H. F. Wickham has collected the adults on elm (*Ulmus* sp.).

LeConte (1859) described the species from a single female from Kansas, and Schaeffer (1909) described the same species under the name of *knausi* from a single male collected at Belvidere, Kans.

The types of both of these species have been studied, and no differences except slight variations and sexual could be found. Horn (1891) has confused a number of species under this name, and the specimen of "*obolinus* No. 3" from Arizona in the LeConte collection is a specimen of *politus* Say, and neither of the two examples in his own collection in the Philadelphia Academy of Natural Sciences is *obolinus* LeConte. These two specimens are labeled "Tex." and "Ariz." and are probably *baboquivariae* Fisher, but at the time these specimens were examined I did not separate *baboquivariae* Fisher from *costipennis* Fisher. The specimens recorded in the literature from California are probably *costipennis* Fisher. Chamberlin (1926) records this species from Ontario, Canada, but that record refers to *obliquus* LeConte instead of *obolinus* LeConte.

This species resembles *politus* Say in general appearance, but it is usually more robust, the pronotum is more or less longitudinally depressed, and it can be separated at once from that species by the scutellum not being transversely carinate.

64. AGRILUS FALLAX Say

Figure 45

Agrilus fallax Say, Trans. Amer. Philos. Soc., vol. 6, new ser., 1836, p. 163.—LeConte, Say's Writings, vol. 2, pp. 596–597 (Baillière Bros. ed., 1859; Cassino and Co. ed., 1883); Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 246.—Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 93.—Zesch and Reinecke, North Amer. Ent. (Buffalo), vol. 1, 1880, p. vii.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 1, no. 1, 1888, p. 87.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 316–317, pl. 8, fig. 2.—Hopkins, Ins. Life, vol. 4, 1892, p. 257; W. Va. Agric. Exp. Sta., Bull. 32, 1893, p. 184.—Stromberg, Canad. Ent., vol. 26, 1894, p. 36.—Hamilton, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364.—Evans, Canad. Ent., vol. 31, 1899, p. 321.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67.—Smith, 27th Rept. N. J. Board Agric. for 1899 (1900), suppl. p. 257.—Ouellet, Le Naturaliste Canadien, vol. 29, 1902, p. 120.—Ulke, Proc. U. S. Nat. Mus., vol. 25, no. 1275, 1902, p. 21.—Felt, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 725.—Houghton, Canad. Ent., vol. 40, 1908, pp. 160–162.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 6, no. 2, 1909 (Author's edition), p. 23.—Blatchley, Coleoptera of Indiana, 1910, p. 802, fig. 311*a*.—Smith, Rept. N. J. State Mus. for 1909 (1910), p. 295.—Frost, Canad. Ent., vol. 44, 1912, p. 248.—Chagnon, 9th Rept. Quebec Soc. Protection Plants, suppl., pt. 3, 1917, p. 219.—Nicolay, Bull. Brooklyn Ent. Soc., vol. 14, 1919, p. 20.—Frost and Weiss, Canad. Ent., vol. 52, 1920, pp. 221–222.—Knull, Ent. News, vol. 31, 1920, p. 10; Canad. Ent., vol. 54, 1922, p. 85.—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 8, pl. 1, fig. 1.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 49, pl. 1, fig. 26.—Chamberlin, Cat. Buprestidae, 1926, pp. 61–62.

Agrilus zemes GORY, Mon. Bupr. Suppl., vol. 4, 1841, p. 234, pl. 39, fig. 225.—LECONTE, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9; Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 250; Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 333.

Agrilus impressipennis UHLER, Proc. Acad. Nat. Sci. Phila., vol. 7, 1855, p. 416.

Male.—Form moderately elongate, feebly flattened above, and moderately shining; head bright green in front, becoming cupreous on the occiput; pronotum and elytra dark olivaceous green, with a more or less distinct cupreous tinge, especially toward the apex, and each elytron ornamented with three more or less distinct pubescent spots; beneath cupreous, the median parts and legs more or less bronzy or greenish, and more shining than above.

Head with the front rather wide, nearly flat, about equal in width at top and bottom, the lateral margins feebly, broadly constricted at the middle, transversely depressed behind the epistoma, a large, distinct, deep fovea behind the antennal cavities, and with a shallow, longitudinal groove extending from the occiput to epistoma; surface densely, coarsely granulose, feebly, sparsely rugose, the rugae longitudinal on the occiput, sparsely punctate between the rugae, and clothed with a few short, recumbent, white hairs behind the epistoma; epistoma strongly transverse between the antennae, and very broadly, deeply, arcuately emarginate in front; antennae extending nearly to posterior angles of pronotum, serrate from the fourth joint, and the outer joints distinctly longer than wide; eyes large, broadly oblong, and slightly more acutely rounded beneath than above.

Pronotum nearly one-third wider than long, slightly narrower at base than apex, and widest near apex; sides nearly parallel at base, obliquely expanded to near the apex, then feebly narrowed to the apical angles; when viewed from the side the marginal and submarginal carinae are strongly sinuate, narrowly separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, with the median lobe broadly rounded; base feebly emarginate at middle of each elytron, the median lobe broadly rounded, and feebly emarginate in front of scutellum; disk moderately convex, with a broad, median depression in front of scutellum, a broad, moderately deep, oblique depression on each side along lateral margin, and with distinct, feebly arcuate, prehumeral carinae, extending from posterior angles to basal third; surface coarsely, deeply, transversely rugose at middle, the rugae becoming more or less longitudinal toward the sides, sparsely, finely punctate between the rugae, and with a few hairs in the lateral depressions. Scutellum strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind the middle; sides nearly parallel or feebly arcuate for a short distance behind the base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips which are separately, rather broadly rounded, and strongly serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, with a vague costa on each side, sutural margins slightly elevated posteriorly, and with broad, shallow basal depressions; surface coarsely, densely imbricate-punctate, and each elytron ornamented with three more or less distinct yellowish pubescent spots, one in basal depression, one in front of middle, and the other at apical third.

Abdomen beneath sparsely, finely punctate, the punctures connected transversely by obsolete, sinuate lines, which are more distinct at sides of basal segment, and sparsely clothed with short, recumbent, white hairs; first and second segments with a broad, median groove, which is finely punctate, and densely clothed with long, semierect, whitish hairs; last segment broadly rounded at apex; vertical portions of segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, feebly carinate anteriorly, but the carina not projecting. Prosternum finely punctate, and densely clothed at middle with long, erect, inconspicuous hairs, which extend along middle of body to the posterior margin of second abdominal segment; prosternal lobe broad, feebly declivous, and broadly subtruncate in front; prosternal process broad, the sides strongly expanded behind the coxal cavities, then strongly narrowed to the apex, which is acute. Tibiae slender, straight, and the anterior and middle pairs with a small tooth on inner margin at apex. Posterior tarsi nearly as long as the tibiae, and the first joint as long as the following three joints united. Tarsal claws dissimilar, anterior ones cleft near tip, and the teeth nearly equal in length; middle and posterior claws cleft near middle, the inner tooth broad, much shorter than outer one, and not turned inward.

Length, 4.8 mm.; width, 1.2 mm.

Female.—Differs from the male in having the head dark olivaceous green, the epistoma cupreous with a roseous tinge, sides of front more parallel, and the surface not distinctly granulose; antennae slightly shorter, and the outer joints scarcely longer than wide; eyes more strongly convex laterally; first and second abdominal segment convex, without a longitudinal groove and not clothed with long hairs at middle; prosternum sparsely clothed with long, recumbent, white hairs, but without long, erect hairs at middle; tibiae without a tooth at apex, and the claws cleft at middle on all feet.

Redescribed from a male collected at Cliff Cave, Mo., April 28, 1878, by F. Pergande. Since the type of this species is lost, I am designating this specimen as the neotype, and depositing it in the United States National Museum collection.

Type localities.—Of *fallax*, Indiana; the type is lost. Of *zemes*, Alabama; present location of type unknown to writer. Of *impressipennis*, Baltimore, Md.; present location of type unknown to writer—probably is lost.

Distribution.—This species is widely distributed and material has been examined from the Province of Quebec, Canada, and various localities in the following States: Alabama, Connecticut, Delaware, District of Columbia, Florida, Illinois, Indiana, Iowa, Kansas, Louisiana, Maryland, Missouri, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

Variations.—The color varies from olivaceous green to reddish cupreous, and the length from 4 to 6 millimeters. The pronotum is usually widest near the apex, but in a few examples it is widest at the middle, and the sides are arcuately rounded. The median depression on the pronotum is quite variable, and may consist of a rather deep depression posteriorly, two vague median depressions, or a feebly impressed median groove, and rarely an example is found without distinct depressions. The pubescent spots are sometimes only feebly indicated, but this is usually due to abrasion.

Hosts.—Has been reared a number of times by different workers from dead and dying honey locust (*Gleditsia triacanthos* Linnaeus) and hackberry (*Celtis occidentalis* Linnaeus). It has also been recorded from black locust, oak, and cottonwood, but these records are probably incorrect.

This species resembles *obsoletoguttatus* Gory very closely and the two species are confused in most collections. It is usually smaller than *obsoletoguttatus* and has the prosternal lobe broadly rounded in front, whereas in *obsoletoguttatus* the lobe is emarginate in front.

65. AGRILUS SCITULUS Horn

Figure 46

Agrilus scitulus Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 318–319.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 222.—Chamberlin, Cat. Buprestidae, 1926, p. 81.

Male.—Form resembling *fallax*; head green, becoming bronzy on the occiput; pronotum bronzy, with a distinct cupreous tinge; elytra piceous, with a more or less distinct purplish tinge, and ornamented with distinct pubescent spots; beneath piceous, with a feeble cupreous or bronzy reflection, and slightly more shining than above.

Head with the front rather wide, slightly convex, about equal in width at top and bottom, the lateral margins feebly, arcuately expanded near middle, transversely depressed behind epistoma, and with a broad, shallow depression near the vertex; surface coarsely rugose, the rugae irregular on the front, becoming longitudinal on the occiput, rather densely, coarsely punctate between the rugae, and sparsely clothed with long, recumbent, yellowish pubescence behind the epistoma; epistoma strongly transverse between the antennae, rather strongly elevated, and broadly, deeply emarginate in front; antennae extending nearly to posterior angles of pronotum, serrate from the fourth joint, and the outer joints distinctly longer than wide; eyes large, rather narrowly oblong, and slightly more acutely rounded beneath than above.

Pronotum slightly wider than long, base and apex about equal in width, and widest near the middle; sides feebly, arcuately rounded anteriorly, and more strongly narrowed behind the middle; when viewed from the side the marginal and submarginal carinae are strongly sinuate, narrowly separated anteriorly, and connected to each other near the middle; anterior margin strongly sinuate, with the median lobe broadly rounded; base feebly emarginate at middle of each elytron, the median lobe broadly rounded, and feebly emarginate in front of scutellum; disk moderately convex, feebly, broadly, transversely concave on basal half, a round, median depression near anterior margin, a broad, oblique depression on each side along lateral margin, and with distinct straight prehumeral carinae, extending from posterior angles to near the middle; surface shining, densely, coarsely rugose, the rugae more or less transverse at middle, becoming oblique toward the sides, obsoletely granulose, rather densely, finely punctate between the rugae, and sparsely clothed with moderately long, recumbent, whitish or yellowish hairs at the sides. Scutellum strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra distinctly wider than pronotum at base, and about equal in width at base and behind the middle; sides feebly rounded behind the base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and finely serrulate; sides of abdomen narrowly exposed above; disk slightly flattened at middle, with a short, vague costa on each side, sutural margins slightly elevated posteriorly, and with rather shallow, broad, basal depressions; surface densely, coarsely imbricate-punctate, sparsely, uniformly clothed on apical fifth with very short, white hairs, and each elytron ornamented with whitish pubescent spots as follows; a large spot in basal depression, a narrow fascia extending from basal fourth to middle, exterior to the posterior end of which is a small round spot, and a larger round spot along suture near apical third.

Abdomen beneath finely, sparsely punctate, more densely so on the first two segments, more or less rugose at the sides, with sparsely pubescent spaces on the first two segments midway between the middle and side, and a similar spot on the third segment at the side; first segment feebly convex, without a median groove; last segment broadly rounded at apex; vertical portions of first segment densely pubescent, second nearly glabrous, and the following segments sparsely pubescent; pygidium coarsely punctate, distinctly carinate, but the carina not projecting. Prosternum finely, densely punctate, densely clothed at middle with long, erect, inconspicuous hairs, which extend on the front of the metasternum; prosternal lobe, broad, moderately declivous, and rather deeply, broadly emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then arcuately narrowed to the apex, which is rather acute. Tibiae slender, straight, and the anterior and middle pairs armed with a distinct tooth on the inner margin at apex. Posterior tarsi about as long as the tibiae, and the first joint as long as the following joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than the outer one, and not turned inward.

Length, 5 mm.; width, 1.25 mm.

Female.—Differs from the male in having the head uniformly bronzy brown, front slightly wider at top than at bottom, the lateral margins feebly, obliquely expanded from bottom to occiput, and with only a few short hairs behind the epistoma; prosternum not clothed with long, erect hairs at middle, and the tibiae without a distinct tooth at apex.

Redescribed from the male lectotype, No. 3485, in the Philadelphia Academy of Natural Sciences.

Type locality.—Texas, no definite locality, but probably at Waco.

DISTRIBUTION

Material examined:

TEXAS: Type locality (probably Waco). Columbus, June (E. A. Schwarz). Also recorded by Chamberlin in the Schaeffer Collection from New Braunfels.

Variations.—In the few specimens examined no variations have been observed except in color and size. The color of the pronotum varies from bronzy green to aureus, with a more or less distinct cupreous tinge, and the length from 3.75 to 5.5 millimeters.

Host.—Chittenden (1900) records this species as having been reared by E. A. Schwarz from huisache (*Acacia farnesiana* (Linnaeus) Willdenow) at San Diego, Tex., but the specimen can not be found, and this host-plant record should be verified.

This species seems to be rare in collections and the eight specimens in the Horn collection in the Academy of Natural Sciences in Philadelphia are labeled simply "Tex.," but Horn (1891) writes that they were collected by Belfrage, and probably at Waco. It resembles *fallax* Say and *obsoletoguttatus* Gory, but can be readily separated from both these species by the pronotum being of a different color than the elytra.

66. AGRILUS OBSOLETOGUTTATUS Gory

Figure 47

Agrilus obsoletoguttatus DEJEAN, Cat. Coleopt., ed. 2, 1833. p. 82; ed. 3, 1837, p. 93 (no description).—GORY, Mon. Bupr. Suppl., vol. 4, 1841, p. 256, pl. 43, fig. 249.—WHITE, Nomenclature Coleopt. Ins. British Mus., pt. 3, 1848, p. 38.—LECONTE, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9; Trans. Amer. Philos. Soc., vol. 11, new ser. 1859. pp. 246. 250.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 317–318, pl. 8, figs. 3, 11, 19.—STROMBERG, Canad. Ent., vol. 26, 1894, p. 36.—SLOSSON, Ent. News, vol. 6, 1895, p. 319.—HAMILTON, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364.—BOWDITCH, Psyche, vol. 7, suppl. 2. 1896, p. 7.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—SMITH, 27th Rept. N. J. State Board Agric. for 1899 (1900), suppl. p. 257.—ULKE, Proc. U. S. Nat. Mus.. vol. 25, no. 1275, 1902, p. 47.—WICKHAM, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 5. no. 3, 1902, p. 269.—FELT, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 701.—WICKHAM, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 6, no. 2, 1909 (Author's edition). p. 23.—SMITH. Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295.—BLATCHLEY. Coleoptera of Indiana, 1910, p. 802, figs. 307, 311*b*.—FROST, Canad. Ent., vol. 44, 1912, pp. 247, 248; Canad. Ent., vol. 47, 1915, p. 144.—JOHNSON, Ent. News, vol. 27, 1916, p. 117.—MORRIS, 47th Rept. Ent. Soc. Ontario for 1916 (1917), p. 22.—CHAGNON, 9th Rept. Quebec Soc. Protection Plants, suppl. pt. 3, 1917, p. 219.—MORRIS, Canad. Ent., vol. 51, 1919. p. 52.—NICOLAY, Bull. Brooklyn Ent. Soc., vol. 14, 1919, p. 20.—BRITTON, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 245.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 222.—KNULL, Ent. News, vol. 31, 1920, pp. 10–11; Canad. Ent., vol. 54, 1922, p. 86.—MUTCHLER and WEISS, N. J. Dept. Agr., Bur. Statistics and Inspection, Circ. 48, p. 9, pl. 1, figs. 2, 8, 9.—KNULL, Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 49–50.—CHAMBERLIN, Cat. Buprestidae, 1926, pp. 72–73.

Agrilus nigricans DEJEAN, Cat. Coleopt., ed. 2, 1833, p. 82; ed. 3, 1837, p. 93 (no description).—GORY, Mon. Bupr. Suppl., vol. 4, p. 257, pl. 43, fig. 250.—LECONTE, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9; Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 250; Proc. Acad. Nat. Sci. Phila., vol. 25, 1873. p. 332.

Agrilus interruptus LECONTE, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 246.—CROTCH, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 93.—ZESCH and REINECKE, North Amer. Ent. (Buffalo), vol. 1, 1880, p. vii.—BLANCHARD, Ent. Amer., vol. 5, 1889, p. 32.—CHITTENDEN, Ent. Amer., vol. 5, 1889, p. 220.—HARRINGTON, 27th Ann. Rept. Ent. Soc. Ontario for 1896 (1897), p. 71.—COCKERELL, New Mex. Agric. Exp. Sta., Bull. 28, 1898, p. 152.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—FELT, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 701.—FALL and COCKERELL, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 181.—EASTON, Psyche, vol. 16, 1909, p. 50.

Agrilus subaeratus HARRIS, (Ms. name).

Male.—Form slender, elongate, feebly flattened above, and moderately shining; head bronzy green to golden green, becoming brownish cupreous on the occiput; pronotum and elytra varying from bronzy black to olivaceous brown, sometimes with a feebly purplish tinge, and each elytron ornamented with three or four whitish or yellowish pubescent spots; beneath bronzy or cupreous, more shining than above, and the legs more or less greenish.

Head with the front rather narrow, nearly flat, about equal in width at top and bottom, the lateral margins broadly, arcuately constricted near the bottom, transversely depressed behind the epistoma, and with a feeble, narrow, longitudinal groove extending from occiput to middle of front; surface finely, densely granulose, densely, coarsely punctate, more or less rugose on front, the rugae becoming longitudinal on the occiput, and sparsely clothed with long, recumbent, whitish hairs, which are denser behind the epistoma; epistoma strongly transverse between the antennae, and rather broadly, deeply emarginate in front; antennae extending nearly to posterior angles of pronotum, serrate from the fourth joint, and the outer joints distinctly longer than wide; eyes large, rather broadly oblong, and about equally rounded above and beneath.

Pronotum one-fourth wider than long, slightly narrower at base than apex, and widest along apical half or near apex; sides feebly arcuate or obliquely narrowed from apex to behind middle, then more strongly narrowed to the posterior angles, which are sharply rectangular; when viewed from the side the marginal and submarginal carinae are strongly sinuate, narrowly separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, with the median lobe broadly rounded; base feebly emarginate at the middle of each elytron, the median lobe broadly rounded, and feebly emarginate in front of scutellum; disk moderately convex, with two more or less distinct median depressions (sometimes one or both nearly obsolete), a broad, moderately deep, oblique depression on each side along lateral margin, and with sharply elevated, straight prehumeral carinae, extending from posterior angles to near middle; surface coarsely, deeply, transversely rugose at middle, finely densely punctate between the rugae, and rather densely clothed with recumbent whitish or yellowish hairs at the sides anteriorly. Scutellum strongly, transversely carinate, and the surface densely finely reticulate.

Elytra wider than pronotum at base, and slightly wider at base than behind the middle; sides nearly parallel and sinuate for a short distance behind the base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and strongly serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, sometimes with a vague costa on each side, sutural margins rather strongly elevated posteriorly, and with broad, moderately deep basal depressions; surface densely, coarsely imbricate-punctate, more or less distinctly clothed posteriorly with short, recumbent yellowish or whitish hairs, and each elytron ornamented with more or less distinct yellowish or whitish pubescent spots as follows: one in basal depression, an elongate fascia extending from basal fourth to middle, a round spot at apical third, and sometimes also a small spot exterior to the posterior end of the middle fascia.

Abdomen beneath finely, densely punctate, the punctures more or less confluent, and rugose on basal segment, rather densely clothed with short, recumbent, whitish or yellowish hairs, and usually with a more or less distinct pubescent spot at the sides of the segments; first segment feebly flattened, without a median groove; last segment broadly rounded at apex; vertical portions of segments rather densely pubescent, except the second, which is nearly glabrous; pygidium coarsely punctate, feebly carinate, but the carina not projecting. Prosternum densely, finely granulose, and densely clothed at middle with long, erect, fine hairs, which extend to the anterior part of metasternum; prosternal lobe broad, moderately declivous, and broadly, deeply emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, anterior pair slightly arcuate, and the anterior and middle pairs with a distinct tooth on the inner margin at apex. Posterior tarsi slightly longer than tibiae, and the first joint as long as the following joints united. Tarsal claws nearly similar on all feet, middle and posterior pairs cleft near the middle, the inner tooth broad, shorter than the outer one, and not turned inward, the anterior ones slightly more deeply cleft, and the teeth more equal in size and length.

Female.—Differs from the male in having the head aeneous or cupreous, front more convex, less closely punctate and the lateral margins more parallel; antennae shorter, and the outer joints scarcely longer than wide; first abdominal segment more convex and sparsely punctured at middle; posterior tarsi not longer than tibiae, and the prosternum not clothed with long hairs at the middle.

Length, 4.75–8 mm.; width, 1–1.75 mm.

Type localities.—Of *obsoletoguttatus*, North America; present location of type unknown to writer. Of *nigricans*, North America; present location of type unknown to writer. Of *interruptus*, Southern States; type in Museum of Comparative Zoölogy.

Distribution.—This species has a wide distribution and material has been examined from the Provinces of Quebec and Ontario, Canada, and various localities in the following States: Connecticut, District of Columbia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Texas, Virginia, West Virginia, and Wisconsin. It has also been recorded by Wickham (1902) from Colorado, Cockerell (1898) from Gallinas Cañon, New Mexico, and by Frost (1912) from Maine.

Variations.—The species is quite variable, and is represented by two forms, the extremes of which seem to indicate two species, but by a careful study of a large series of examples from all localities, no valid character could be found for separating them. The form found in the northern part of the country is the one described by Gory as *obsoletoguttatus* and *nigricans.* Gory in describing the former gives *subaeratus* Harris (manuscript name) which was probably collected in Massachusetts. This form is usually of a bronzy black color, and the pubescent spots are composed of whitish hairs and are only feebly indicated. The form found in Texas and the Southern States was described by LeConte as *interruptus* and is usually olivaceous brown, with the pubescent spots composed of yellowish hairs, and are usually quite distinct.

The pronotum is more or less variable in shape, and in some specimens the sides are obliquely expanded from base to near the apex, whereas in others they are nearly parallel to each other along the apical half. The median depressions on the pronotum are quite distinct in some examples, whereas in other examples, one or sometimes both of these depressions are only feebly indicated. In some specimens, especially those from the south, the sides of the pronotum, sides of the sternum, and spots at sides of abdomen are densely covered with whitish efflorescence.

Hosts.—This species has been reared by J. N. Knull from dead branches of beech (*Fagus grandifolia* Ehrhart, Synonym *F. americana* Sweet); blue beech (*Carpinus caroliniana* Walter); ironwood or hop-hornbeam (*Ostrya virginiana* (Miller) Koch); red oak (*Quercus rubra* Linnaeus); hickory (*Hicoria* sp.), and sweet birch (*Betula lenta* Linnaeus).

67. AGRILUS LAUTUELLUS, new species

Figure 48

Male.—Form resembling that of *ornatulus* Horn; head green, with a feeble bronzy tinge in front, becoming bronzy brown on the occiput; prosternum and elytra moderately shining, bronzy brown, with more or less distinct cupreous tinge, the elytra sometimes with a violaceous tinge on the postmedian glabrous area, and with distinct pubescent designs; beneath cupreous brown, the legs slightly bronzy, and more shining than above.

Head with the front narrow, strongly convex, slightly wider at bottom than at top, the lateral margins feebly narrowed from bottom to vertex, and with a feeble, narrow groove extending from the occiput to near middle of front; surface irregularly, transversely rugose in front, longitudinally rugose on the occiput, feebly, sparsely punctate between the rugae, and clothed with a few, rather indistinct, white hairs behind the epistoma; epistoma slightly transverse between the antennae, and feebly, broadly, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes rather small, narrowly oblong, broadly rounded above, and acutely angulated beneath.

Pronotum one-third wider than long, base and apex about equal in width, and widest at middle; sides regularly, arcuately rounded from base to apical angles; when viewed from the side the marginal and submarginal carinae are nearly straight, widely separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate, with the median lobe broadly rounded; base nearly transversely truncate, with the median lobe scarcely indicated; disk moderately convex, feebly, narrowly concave along the sides, and without median depressions or prehumeral carinae; surface obsoletely granulose, feebly, obliquely rugose at middle, longitudinally rugose toward the sides, with a few fine punctures between the rugae, and clothed with short, recumbent, whitish hairs, which are sparsely, regularly placed on disk, but slightly longer and denser along the lateral margins. Scutellum strongly, transversely carinate, and the surface finely granulose or recticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind the middle; sides parallel for a short distance behind base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather broadly, obliquely rounded, and finely serrulate; sides of abdomen narrowly exposed above; disk feebly flattened, without costa, and with broad, shallow basal depressions; surface feebly, coarsely imbricate-punctate, and each elytron ornamented with silvery white pubescent designs as follows; a rather broad arcuate fascia extending from basal depression inward to the sutural margin, then outward to the lateral margin near middle, and nearly the entire apical half pubescent, with the anterior margin of pubescent area extending feebly, obliquely backward from the suture near middle to the lateral margin.

Abdomen beneath obsoletely granulose, sparsely punctate, the punctures connected transversely by more or less distinct sinuate lines toward the sides, sparsely clothed with short, recumbent, whitish hairs, and with an obsolete pubescent spot at sides of third segment; first segment feebly convex, without a median groove; last segment broadly rounded at apex; vertical portions of the first segment slightly more pubescent than rest of segments; pygidium sparsely punctate, and without a projecting carina. Prosternum obsoletely granulose, sparsely punctate, and clothed with a few rather long, recumbent, whitish hairs; prosternal lobe broad, feebly declivous, and broadly, but not deeply, arcuately emarginate in front; prosternal process broad, the sides strongly expanded behind the coxal cavities, and the apex subtruncate, with an acute tooth at middle. Sides of mesosternum and metasternum more or less densely pubescent. Tibiae slender, nearly straight, and the anterior and middle pairs armed with a small tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint about as long as the following three joints united. Tarsal claws dissimilar, anterior ones cleft near tip, and the teeth nearly equal in length; middle, and posterior claws cleft near middle, the inner tooth broad, much shorter than the outer one, and not turned inward.

Female.—Differs from the male in havings the head uniformly cupreous brown, the lateral margins nearly parallel, front about equal in width at bottom and top, and the surface not so distinctly rugose; prosternum smoother; tibiae without a distinct tooth at apex, and the tarsal claws cleft near the middle on all feet.

Length, 3–3.5 mm.; width, 0.85–1 mm.

Type locality.—San Diego, Tex.

Other localities.—Texas; Zavalla County, Nueces River; Sabinal; Devil's River; Del Rio; New Braunfels.

Type, allotype, and paratypes.—Cat. No. 41001, U.S.N.M.

Paratypes.—Collection of H. F. Wickham.

Described from 14 specimens (one type), all from Texas. Type, allotype and one paratype collected at the type locality on May 18, by E. A. Schwarz; 4 paratypes collected in Zavalla County, Nueces River, April 26–27, 1910, by Hunter and Pratt; 2 paratypes collected at Sabinal, May, 1910, and June 3, 1910, by Pierce and Pratt; 3 paratypes collected at Devil's River, May 3–5, 1907, by E. A. Schwarz and F. C. Pratt; one paratype collected at Del Rio, June 22–27, by H. F. Wickham, and another paratype collected at New Braunfels, June 16, by the same collector.

This species resembles *ornatulus* Horn very closely, and is probably confused with that species in some of the collections. It can, however, be separately from *ornatulus* by the pronotum and elytra being bronzy brown and strongly shining, the anterior pubescent design on the elytra entire and longitudinally arcuate, and by the male genitalia having the exterior margin of the lateral lobes distinctly angulated.

68. AGRILUS ORNATULUS Horn

Figure 49

Agrilus ornatulus Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 319–320, pl. 8, fig. 4.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 222.—Chamberlin, Cat. Buprestidae, 1926, p. 73.

Female.—Small, robust, scarcely narrowed posteriorly, and feebly flattened; head uniformly brownish cupreous; pronotum and elytra piceous, the former subopaque, and the latter moderately shining, with a more or less distinct bluish or violaceous tinge (humeri strongly aeneous), and ornamented with distinct pubescent designs; beneath piceous, with a distinct bronzy reflection.

Head with the front rather wide, strongly convex, equal in width at bottom and top, the lateral margins parallel to each other, and without a distnict median groove; surface finely, densely granulose, sparsely, coarsely punctate, somewhat longitudinally rugose on occiput, and without distinct pubescence; epistoma slightly transverse between the antennae, clypeal suture elevated, and deeply, broadly, angularly emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints slightly wider than long; eyes rather small, narrowly oblong, broadly rounded above, and acutely angulated beneath.

Pronotum nearly one-third wider than long, slightly wider at apex than at base, and widest near apical third; sides broadly rounded from apical angle to behind middle, then more obliquely narrowed to the posterior angle, which is slightly projecting and acute; when viewed from the side the marginal and submarginal carinae are nearly straight, widely separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate, with the median lobe broadly rounded; base nearly transversely truncate, feebly emarginate at middle of each elytron, and the median lobe very broadly, but feebly rounded in front of scutellum; disk moderately convex, feebly, narrowly concave along the sides, and without median depressions or prehumeral carinae; surface densely, finely granulose, obliquely rugose at middle, longitudinally rugose toward the sides, with a few fine punctures between the rugae, and clothed with short, recumbent, silvery white pubescence, the hairs indistinct and widely separated on disk, but becoming denser in the concave area along lateral margins. Scutellum strongly, transversely carinate, and the surface finely granulose or reticulate.

Elytra wider than pronotum at base, and equal in width at base and behind the middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather broadly, obliquely rounded, and not serrulate; sides of abdomen broadly exposed above; disk feebly depressed along suture, a vague costa on each side, and with broad, shallow, basal depressions; surface indistinctly imbricate-punctate and granulose, each elytron ornated with silvery white pubescent designs as follows; a small patch in basal depression, an oblique band behind this at suture, a longitudinal band along suture, extending to near the middle, bending obliquely outward and backward (sometimes divided), and the apical third entirely pubescent, the anterior margin of area extending obliquely backward from the suture at middle to lateral margin near apical third.

Abdomen beneath densely, finely granulose, sparsely punctate, the punctures denser and connected transversely by sinuate lines at sides of basal segments, sparsely clothed with short, inconspicuous hairs, and with a feeble pubescent spot at sides of third segment; first segment feebly convex, without a median groove; last segment broadly rounded at apex; vertical portions of first and second segments densely pubescent; pygidium finely, sparsely punctate, and distinctly carinate, but the carina not projecting. Prosternum densely granulose, sparsely punctate, and clothed with a few short recumbent, white hairs; prosternal lobe, broad, feebly declivous, and with a deep, semicircular emargination in front; prosternal process broad, the sides feebly expanded behind the coxal cavities, and obtusely angulated at apex. Sides of metasternum and mesosternum densely pubescent and efflorescent. Tibiae slender, straight, and without a distinct tooth on inner margin at apex. Posterior tarsi distinctly shorter than the tibiae, and the first joint about as long as the following two joints united. Tarsal claws similar on all feet, cleft near middle, the inner tooth broad, much shorter than outer one, and not turned inward.

Length, 3.75 mm.; width, 1.12 mm.

Male.—Differs from the female in having the head bright green in front, becoming brownish black on the occiput, front rather narrow, slightly wider at bottom than at top, the lateral margins feebly narrowed from bottom to vertex, and the surface densely clothed with long, recumbent, silvery white hairs behind the epistoma; antennae with the outer joints about as long as wide; abdomen more narrowly exposed above; legs bronzy green on the ventral side, and the anterior and middle tibiae armed with a small tooth on inner margin at apex; tarsal claws dissimilar, anterior claws cleft near the tip, and the teeth nearly equal in length, the middle and posterior claws cleft near the middle, the inner tooth broad, much shorter than outer one, and not turned inward.

Redescribed from the female lectotype, No. 3486, in the Philadelphia Academy of Natural Sciences.

Type locality.—Southwestern Texas, no definite locality.

DISTRIBUTION

Material examined:

TEXAS: Type series (2 females labeled "Tex."). Victoria, June 15 (J. D. Mitchell). Dallas, May 19 (E. S. Tucker). Austin, June 28 (———). Columbus, June 3 (Hubbard and Schwarz).

Variations.—Scarcely any variation in size, color, or markings were observed in the material examined.

Host.—Chittenden (1900) writes that E. A. Schwarz reports it breeding in huisache (*Acacia farnesiana* (Linnaeus) Willdenow), but since none of the Texas specimens have rearing labels attached, this record may apply either to this species or to *lautuellus* Fisher, as both these closely allied species have been collected by Schwarz in Texas. This host plant record should be verified.

69. AGRILUS DOZIERI Fisher

Figure 50

Agrilus dozieri FISHER, Proc. Ent. Soc. Wash., vol. 20, 1918, pp. 67–68.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 207.—NICOLAY, Journ. N. Y. Ent. Soc., vol. 29, 1921, p. 175.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 59.

Male.—Form slightly more slender than that of *bilineatus* (Weber), and subopaque; head dark green in front, becoming black on the occiput; pronotum reddish cupreous; elytra black; beneath black, with a more or less violaceous or cupreous tinge, and slightly more shining than above.

Head with the front rather narrow, and distinctly wider at top than bottom, the lateral margins broadly, arcuately constricted behind the epistoma, broadly depressed, the depression deeper and strongly transverse on vertex, but not as deeply depressed as in *vittaticollis*, and with a feeble longitudinal groove extending from occiput to middle of front; surface obsoletely granulose, finely, sparsely punctate, densely, irregularly rugose in front, becoming longitudinally rugose on the occiput, and rather densely clothed with long, recumbent, whitish hairs, except on the occiput; epistoma slightly transverse between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending beyond middle of pronotum, serrate from the fourth joint, and the outer joints longer than wide; eyes large, rather broadly oblong, and about equally rounded above and beneath.

Pronotum slightly wider than long, wider at apex than base, and widest near apex; sides obliquely or feebly, arcuately narrowed from apical angles to near base, where they are slightly sinuate; when viewed from the side the marginal and submarginal carinae are slightly sinuate, rather narrowly separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, with the median lobe strongly, broadly rounded; base feebly, transversely sinuate to the median lobe, which is feebly emarginate in front of the scutellum; disk moderately convex, the median line with a feeble, broad, anterior and posterior depression, with a broad, deep, oblique depression on each side along lateral margin extending nearly to median line, and with sharply defined, long, straight, prehumeral carinae; surface strongly, not closely, transversely rugose, sparsely, finely punctate between the rugae, and clothed with a median band of sparsely placed, long, recumbent, yellowish pubescence, which is often denuded, and a broad band of similar pubescence extending along lateral margins from apical angles to posterior angles. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base and slightly wider at base than behind middle; sides nearly parallel for a short distance behind base, vaguely, arcuately constricted in front of middle, feebly expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and strongly serrulate; sides of abdomen scarcely exposed above; disk more or less longitudinally depressed, with a vague indication of longitudinal costa, sutural margins slightly elevated posteriorly, and with broad, deep basal depressions; surface densely, coarsely granulose, and sparsely, uniformly clothed with short, inconspicuous hairs.

Abdomen beneath obsoletely reticulate, finely punctate, the punctures more or less connected transversely by sinuate lines, sparsely placed on median part, denser at the sides, becoming coarsely scabrous on the two basal segments, and sparsely clothed with short, inconspicuous hairs; first segment feebly, longitudinally concave at middle; last segment broadly rounded at apex; vertical portions of the segments densely clothed with long, recumbent, yellowish pubescence; pygidium sparsely, coarsely punctate, strongly carinate, but the carina not projecting. Prosternum finely, densely punctate or granulose, and sparsely clothed with long, erect, fine hairs; prosternal lobe broad, moderately declivous, and broadly, rather deeply, arcuately emarginate in front; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Posterior coxae with the posterior margin feebly, transversely sinuate, and the exterior angle rectangular. Tibiae slender, and the anterior and middle pairs armed with a distinct tooth on inner margin at apex. Posterior tarsi as long as the tibiae, and the first joint as long as the following joints united. Tarsal claws dissimilar, anterior and middle claws cleft near the tip, and the teeth nearly equal in length; posterior claws cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Length, 6.5 mm.; width, 1.35 mm.

Female.—Differs from the male in having the front of head reddish cupreous; antennal joints 6 to 11 as wide as long; prosternum more sparsely punctured, sometimes transversely rugose, and without long, erect pubescence; first abdominal segment not depressed at middle; anterior and middle tibiae armed with an indistinct tooth at apex, and the tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Length, 5.25 mm.; width, 1.25 mm.

Redescribed from the male type and female allotype (Cat. No. 21708) in the United States National Museum.

Type locality.—Gainesville, Florida.

DISTRIBUTION

Florida: Gainesville, March 27, 1917 (H. L. Dozier). Archer, March 28 (A. Koebele). Enterprise, June 17 (Hubbard and Schwarz). Sanford, May 12 (J. A. Reeves).

Variations.—No variation worthy of note has been observed in the specimens examined except in size, which varies from 6 to 8 millimeters in length.

Host.—The larval habits are unknown, but since H. L. Dozier collected the adults abundantly on the foliage of ironwood or hop-hornbeam (*Ostrya virginiana* (Miller) Koch), it is probably the host plant for the larvae of this species. Under the description of this species the adults were recorded as having been collected on blue beech which was incorrect, but should have been hop-hornbeam.

This species is rare in collections but Dozier reports it fairly abundant on the foliage of hop-hornbeam. It resembles *vittaticollis* and *audax* but is more slender than either of these two species. It also differs from both these species by not having the pygidium carinate, and by having the posterior angles of the pronotum strongly carinate in both sexes, whereas in *vittaticollis* and *audax* there is no trace of carinae.

70. AGRILUS VIRIDIS var. FAGI (Ratzeburg)[5]

Figure 51

Buprestis fagi Ratzeburg, Forst-Insecten, pt. 1, 1839, pp. 63–64, pl. 2, fig. 8.

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[5] Dr. Jan Obenberger (Ann. Zool. Mus. Polonici Hist. Nat., vol. 6, 1927, pp. 211, 219–220, 237–239, pl. 5, fig. 9) writes that the species identified as *Agrilus viridis* variety *fagi* Ratzeburg which makes galls on rose stems in America, is *Agrilus communis* aberration *rubicola* described by Abeille de Perrin, in the Revue d'Entomol., vol. 16, 1897, p. 15, and is distributed throughout the western, eastern, and southern parts of Europe.

Agrilus viridis var *fagi* (Ratzeburg) GLOVER, Illustr. N. Amer. Ent., 1878, Coleopt., pl. A, fig. 33 (no text).—WEISS, Journ. Econ. Ent., vol. 7, 1914, p. 438 (footnote); Journ. Econ. Ent., vol. 8, 1915, p. 134; vol. 9, 1916, p. 213.—SCHAUFUSS, Calwer's Käferbuch, vol. 1, 1916 (6th ed.), pp. 700–701.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 221.—NICOLAY, Journ. N. Y. Ent. Soc., vol. 29, 1921, p. 175.—WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 36, 1921, pp. 9–10, fig. 10.—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, pp. 13–14, fig. 9.—KNULL, Canad. Ent., vol. 54, 1922, pp. 85–86.—FROST, Bull. Brooklyn, Ent. Soc., vol. 19, 1924, p. 27.—KNULL, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 47, pl. 9, fig. 3.—BRITTON, Conn. Agric. Exp. Sta., Bull. 275, 1926, p. 325, pl. 19, fig. *a*.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 85.—WELLS, Ent. News, vol. 37, 1926, p. 256.—BRITTON and ZAPPE, Conn. Agric. Exp. Sta., Bull. 292, 1927, p. 158, pl. 13, fig. *b*.

Buprestid. HEADLEE, N. J. Agric. Exp. Sta., Ent. Rept. for 1913 (1914), p. 657.

Agrilus politus WEISS (not Say), Journ. Econ. Ent., vol. 7, 1914, pp. 438–440.

Agrilus viridis WEISS (not Linnaeus), Ent. News, vol. 28, 1916, pp. 287, 426.—PIERCE, U. S. Dept. Agric., Man. Dangerous Ins., 1917, pp. 150–151.—FELT, 35th Rept. N. Y. State Ent. for 1921 (1923), p. 118; Man. Tree and Shrub Ins., 1924, pp. 64–65.

(Bibliography not complete for the European literature.)

Male.—Form small, rather slender and moderately flattened above; head green in front, becoming more cupreous on occiput; pronotum and elytra olivaceous bronze, with a more or less distinct cupreous tinge; beneath slightly more shining than above.

Head with the front rather wide, feebly convex, distinctly wider at top than bottom, lateral margins nearly parallel from top to middle, then strongly, obliquely narrowed to the bottom, and with a feeble, longitudinal groove extending from the occiput to vertex; surface densely, coarsely punctate, coarsely rugose, the rugae confused on the front, but becoming longitudinal on the occiput, and clothed with a few inconspicuous hairs; epistoma transverse between the antennae, and broadly, deeply emarginate in front; antennae extending to about middle of pronotum, serrate from the fourth joint, and the outer joints distinctly wider than long; eyes rather large, rather broadly oblong, and about equally rounded above and beneath.

Pronotum one-half wider than long, about equal in width at base and apex, and widest near apical fourth; sides obliquely or feebly, arcuately expanded from base to apical fourth, then arcuately narrowed to the apical angles; when viewed from the side the marginal carina is slightly sinuate, the submarginal one nearly straight, the two carinae widely separated anteriorly, and connected to each other near the base; anterior margin feebly sinuate, and the median lobe scarcely developed; base slightly emarginate at the middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, sometimes with two obsolete median depressions, a broad, shallow depression on each side along lateral margin at middle, and with a short, feebly arcuate prehumeral carina; surface densely, transversely rugose, and rather densely, finely punctate between the rugae. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and just behind the middle; sides feebly, arcuately rounded behind the base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and minutely serrulate; sides of abdomen narrowly exposed above; disk feebly flattened, sutural margin strongly elevated posteriorly, and with broad, deep basal depressions; surface densely, finely imbricate-punctate, and glabrous.

Abdomen beneath finely, densely punctate, the punctures connected transversely by fine, crenulate lines, which are much coarser on the basal segment, and rather sparsely, evenly clothed with short, recumbent, whitish hairs; first segment strongly convex, and without a median groove; last segment broadly rounded at apex; vertical portions of the segments not conspicuously pubescent; pygidium coarsely punctate, but not distinctly carinate. Prosternum coarsely, densely punctate, somewhat rugose, and rather densely clothed with long, erect inconspicuous hairs; prosternal lobe broad, moderately declivous, and broadly rounded in front; prosternal process rather broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is narrowly rounded. Tibiae slender, anterior pair slightly arcuate, and the anterior and middle pairs armed with a minute tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint about as long as the following three joints united. Tarsal claws dissimilar, anterior and middle ones feebly cleft near the tip, the teeth acute at tips and nearly equal in length; posterior claws cleft near the middle, the inner tooth broad, much shorter than the outer one, and not turned inward.

Female.—Differs from the male in having the head entirely cupreous, usually more uniformly cupreous above and beneath, front of head broader and more convex; antennae scarcely extending beyond anterior margin of pronotum; abdomen beneath more convex, shining, and the punctures and pubescence finer; prosternum smoother and without long, erect hairs; tibiae without a tooth at apex, and the tarsal claws similar on all feet, cleft near the middle, and the inner tooth much shorter and broader than the outer one.

Length, 4–6.25 mm.; width, 1–1.75 mm.

Redescribed from material reared from swellings on rose stems collected in New Jersey.

Type locality.—Germany. Present location of type unknown to the writer.

DISTRIBUTION

In the United States:

CONNECTICUT: Darien, reared (J. D. Bourger). Norwalk (W. E. Britton).

MASSACHUSETTS: Hopkinton, June 7, 1925; Southborough, June 17, 1923 (C. A Frost).

MICHIGAN: Ann Arbor, reared June 18, 1926 (E. W. Erlanson).

NEW JERSEY: New Brunswick, May 19; Plainfield, June 4 (A. S. Nicolay). Elizabeth; Millburn; Rutherford; Springfield; Englewood (H. B. Weiss); Nutley (E. L. Dickerson).

NEW YORK: New York City (intercepted in rose stock from France and Holland).

PENNSYLVANIA: West Chester, June; Erie and Girard (F. M. Trimble); Presque Isle (Craighead and Knull); Philadelphia (J. N. Knull).

Variations.—This form is rather constant except in size. The color varies slightly from olivaceous bronze to brownish cupreous, and the prehumeral carinae are rather sharply defined in some examples, whereas in others they are only feebly indicated.

Host.—This variety was described from beech, but the European host plant records are confused with *viridis* and its many varieties and aberrations. In the United States the form described above makes galls or abnormal swellings on the stems of *Rosa rugosa*, *Rosa blanda*, *Rosa multiflora japonica*, *Rosa rubrafolia*, *Rosa nitida*, *Rosa setigera*, *Rosa hugonis*, and the wild rose (*Rosa carolina*).

This insect was first discovered in this country during August, 1923, by Harry B. Weiss and E. L. Dickerson while inspecting nurseries in the northern part of New Jersey, where it had killed a number of roses. At first it was supposed to be a variation of *politus* Say, but C. A. Frost sent specimens to Charles Kerremans, who replied as follows: "I have examined your *Agrilus* very carefully and it seems to be a variety of the European *viridis* Linn. and it resembles very closely the variety *fagi* Ratz., but is smaller. The elytral sculpture and the bronze copper coloration are the same, only the head is a little more irregular and the front being less smooth. It presents all of the specific characters of *viridis*, but *fagi* is not, on the whole, as coppery colored as *viridis*."

I do not believe this is the true *fagi* described by Ratzeburg which breeds in beech in Europe, but I have been unable to get authentically identified specimens for comparison.

This introduced variety resembles very closely some forms of *politus*, and great difficulty will be experienced in separating some examples from that species, and especially those that have been collected promiscuously. If it were not definitely known that this variety had been introduced into this country in rose stalks, it could easily be placed as a subspecies of *politus*. In *fagi* the prosternal lobe is broadly rounded in front, whereas in *politus* it is usually feebly emarginate, but rarely specimens are found in which the anterior margin is subtruncate, and there will be some difficulty in separating these examples from *fagi*. Genitalia with the sides more parallel than in *politus;* otherwise they are very similar.

71. AGRILUS POLITUS (Say)

Figure 52

Buprestis polita SAY, Ann. Lyc. Nat. Hist. New York, vol. 1, 1825, pp. 251–252.—LECONTE, Say's Writings, vol. 1, pp. 387–388 (Baillière Bros. ed., 1859; Cassino and Co. ed., 1883).

Agrilus politus SAY, Trans. Amer. Philos. Soc., vol. 6, new ser., 1836, p. 162.—LECONTE, Journ. Acad. Nat. Sci. Phila., vol. 4, ser. 2, 1858, p. 35; Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 248; Say's Writings, vol. 2, p. 596 (Baillière Bros. ed., 1859; Cassino and Co. ed., 1883).—HORN, Trans. Amer. Ent. Soc., vol. 2, 1868, p. 124.—PETTIT, Canad. Ent., vol. 2, 1870, p. 102.—PROVANCHER, Petite Faune Entomologique du Canada, vol. 1, Les Coleopteres, 1877, p. 359–360.—HUBBARD and SCHWARZ, Proc. Amer. Philos. Soc., vol. 17, 1878, pp. 636, 656.—GLOVER, Illustrations North Amer. Ent., Coleopt., 1878, pl. 11, fig. 2 (no text).—LECONTE, Bull. U. S. Geol. and Geog. Survey, vol. 5, 1879, p. 504.—ZESCH and REINECKE, North Amer. Ent. (Buffalo, N. Y.), vol. 1, 1880, p. vii.—LUGGER, Psyche, vol. 4, 1884, p. 203. (This is *egenus* GORY.)—CHITTENDEN, Ent. Amer., vol. 5, 1889, p. 220.—BLANCHARD, Ent. Amer., vol. 5, 1889, p. 32.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 315–316, pl. 8, fig. 7.—HOPKINS, W. Va. Agric. Exp. Sta., Bull. 32, 1893, p. 184.—FALL, Ent. News, vol. 5, 1894, p. 98.—EVANS, Canad. Ent., vol. 27, 1895, p. 146.—HAMILTON, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364.—WICKHAM, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 3, no. 3, 1895, p. 38; Proc. Davenport Acad. Nat. Sci., vol. 6, 1896, p. 152 (Author's edition).—COCKERELL, New Mex. Agric. Exp. Sta., Bull. 28, 1898, p. 152.—EVANS, Canad. Ent., vol. 31, 1899, p. 321.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68 (part).—SMITH, 27th Rept. N. J. State Board Agric. for 1899 (1900), suppl., p. 257.—FALL, Calif. Acad. Sci., Occasional Papers, no. 8, 1901, pp. 23, 120.—ULKE, Proc. U. S. Nat. Mus., vol. 25, no. 1275, 1902, p. 47.—KNAUS, Ent. News, vol. 13, 1902, p. 148.—SKINNER, Trans. Amer. Ent. Soc., vol. 29, 1902, p. 40.—WICKHAM, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 5, no. 3, 1902, p. 269 (part).—YOUNG, 18th Rept. N. Y. State Ent. for 1902 (1903), p. 157.—FELT, N. Y. State Mus., Mem. 8, vol. 2, 1906, pp. 729, 741 (part).—(——) Bull. Br. Columbia Ent. Soc., no. 2, 1906, p. 4 (reprint 1926).—FALL, Ent. News, vol. 17, 1906, p. 168.—FALL and COCKERELL, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 181.—WICKHAM, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 6, no. 2, 1909, p. 23 (Author's edition).—EASTON, Psyche, vol. 16, 1909, p. 50.—BLATCHLEY, Coleoptera of Indiana, 1910, pp. 801–802.—SMITH, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295.—FROST, Canad. Ent., vol. 44, 1912, p. 248.—GIBSON, 43d Rept. Ent. Soc. Ontario for 1912 (1913), p. 126 (separate p. 14).—Manee, Ent. News, vol. 24, 1913, p. 171.—Woodworth, Guide to California Insects, 1913, p. 194 (part).—Weiss, Journ. Econ. Ent., vol. 7, 1914, pp. 438–440. (This is *fagi* Ratzeburg.)—Childs, Monthly Bull. Calif. State Comm. Hort., vol. 3, 1914, pp. 150–155, figs. 54–56. (This is *angelicus* Horn.)—Essig, Injurious and Beneficial Insects of California, 1915, p. 234, fig. 223 (part *angelicus*).—Frost, Canad. Ent., vol. 47, 1915, p. 144; Canad. Ent., vol. 48, 1916, p. 286. (This is *pseudocoryli*).—Fisher, Canad. Ent., vol. 49, 1917, pp. 288–289.—Nicolay, Bull. Brooklyn Ent. Soc., vol. 12, 1917, p. 93.—Chagnon, 9th Rept. Quebec Soc. Protection Plants, suppl. pt. 3, 1917, p. 219.—Chamberlin, Ent. News, vol. 28, 1917, p. 168 (part).—Burke, Journ. Econ. Ent., vol. 10, 1917, p. 331 (part); U. S. Dept. Agric., Bull. 437, 1917, pl. 9, fig. 3 (no text).—Ruggles, 17th Rept. Ent. Minn., 1918, p. 15. (This is *arcuatus* Say.)—Felt, N. Y. State Mus., Bull. 200, 1918, pp. 37, 49, 135 (part).—Britton, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 245.—Frost, Canad. Ent., vol. 52, 1920, p. 28. (This is *pseudocoryli*.)—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 220 (part); Canad. Ent., vol. 52, 1920, p. 247.—Knull, Ent. News, vol. 31, 1920, p. 10; Canad. Ent., vol. 54, 1922, p. 85.—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, pp. 9–10, pl. 1, fig. 4 (part).—Frost, Canad. Ent., vol. 54, 1922, p. 96.—Wellhouse, Cornell Agric. Exp. Sta., Mem. 56, 1922, p. 1106 (part).—Hutchings, 53d Rept. Ent. Soc. Ontario, 1923, pp. 44, 45–46, fig. (This is *pseudocoryli*.)—Hatch, Mich. Acad. Sci., Arts and Letters, vol. 4, 1924, p. 571.—Chamberlin, Journ. N. Y. Ent. Soc., vol. 32, for 1924 (1925), p. 194 (part).—Chapin, U. S. Dept. Agric., Bull. 1355, 1925, p. 33.—Champlain and Knull, Canad. Ent., vol. 57, 1925, p. 113 (part).—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 47–48 (part).—Essig, Insects Western North America, 1926, p. 403 (part).—Chamberlin, Cat. Buprestidae, 1926, pp. 77–78 (part).—Fall, Pan-Pacific Entomol., vol. 2, 1926, p. 193.

Agrilus desertus LeConte, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 249.

Agrilus cupreolus LeConte, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 248.

Agrilus plumbeus LeConte, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 247.—Pettit, Canad. Ent., vol. 2, 1870, p. 102.—Hubbard and Schwarz, Proc. Amer. Philos. Soc., vol. 17, 1878, p. 636, 656.—Ouellet, Le Naturaliste Canadien, vol. 29, 1902, p. 120.

Agrilus solitarius Harold, Coleopterologische Hefte, vol. 5, 1869, p. 124 (new name for *desertus* LeConte).—Gemminger and Harold, Cat. Coleopt., vol. 5, 1869, p. 1445.—Fisher, Canad. Ent., vol. 49, 1917, pp. 288–289.—Burke, Journ. Econ. Ent., vol. 10, 1917, p. 331.

Agrilus sp., (——), U. S. Dept. Agric., Yearbook for 1908 (1909), p. 578.

Agrilus canadensis Obenberger, Entomol. Blätter, vol. 13, 1917, p. 181 (new synonymy).—Chamberlin, Cat. Buprestidae, 1926, p. 56.

Agrilus politus var. *corylus* Gibson (not Horn), 48th Rept. Ent. Soc. Ontario for 1917 (1918), p. 112. (This is *pseudocoryli*.)

Agrilus niveiventris Wickham (not Horn), Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 5, no. 3, 1902, p. 269. (Probably *politus*.)

Male.—Form elongate, rather strongly attenuate posteriorly, feebly flattened above, and strongly shining; head bronzy green in front, becoming aureo-cupreous on the occiput; pronotum and elytra reddish cupreous, with a more or less aureous tinge; beneath aeneo-cupreous.

Head with the front rather broad, feebly convex, slightly wider at top than bottom, the lateral margins feebly, arcuately expanded at middle, and without distinct depressions; surface rather densely, coarsely punctate, more or less irregularly rugose, the rugae becoming longitudinally on the occiput, and sparsely clothed with short, whitish hairs; epistoma slightly transverse between the antennæ, and broadly, deeply, arcuately emarginate in front; antennae extending to apical third of pronotum, serrate from the fourth joint, and the outer joints wider than long; eyes moderately large, narrowly oblong, and about equally rounded above and beneath.

Pronotum two-thirds wider than long, slightly wider at apex than base, and widest near middle; sides feebly, arcuately rounded from apical angles to near base where they are parallel to each other; when viewed from the side the marginal and submarginal carinae are vaguely sinuate, rather narrowly separated anteriorly, and connected to each other behind the middle; anterior margin slightly sinuate, and the median lobe scarcely produced; base slightly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of the scutellum; disk moderately convex, with two broad, vague median depressions, a broad, shallow lateral depression on each side, and with distinct, arcuate prehumeral carinae; surface coarsely, transversely rugose, finely, sparsely punctate between the rugae, and sparsely clothed toward the sides with short, inconspicuous hairs. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides feebly, broadly constricted in front of middle, feebly, arcuately expanded behind the middle, more or less sinuate near the tips, which are separately, rather narrowly rounded, and strongly serrulate; sides of abdomen narrowly exposed above; disk slightly flattened above, without a distinct longitudinal costa, the sutural margins strongly elevated behind the middle, and with broad, moderately deep basal depressions; surface densely, coarsely imbricate-punctate, and sparsely clothed with very short white hairs.

Abdomen beneath obsoletely granulose, sparsely, finely punctate, more densely toward the sides of basal segment, and sparsely, uniformly clothed with short, recumbent, whitish hairs; first segment convex, and without a median depression; last segment broadly rounded at apex; vertical portions of segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, feebly longitudinally carinate, but the carina not projecting. Prosternum sparsely, finely punctate, and rather densely clothed with long, very fine, erect hairs; prosternal lobe broad, strongly declivous, and feebly, broadly, arcuately emarginate in front; posternal process moderately broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a short tooth on the inner margin at apex. Posterior tarsi about as long as the tibiae, and the first joint as long as the following three joints united. Tarsal claws dissimilar, anterior and middle ones cleft near the tip, the teeth about equal in length, and the inner tooth not turned inward; posterior claws cleft near the middle, and the inner tooth much broader and shorter than the outer one.

Length, 5.5 mm.; width, 1.125 mm.

Female.—Differs from the male in being usually more robust, front of the head broader, uniformly reddish cupreous, and the lateral margins more parallel; sides of abdomen more broadly exposed above; prosternum clothed with short, semierect hairs; tibiae without a distinct tooth at apex, and the tarsal claws similar on all feet, cleft near the middle. with the inner tooth shorter and broader than the outer one.

Redescribed from a male collected in Illinois which agrees very closely with the original description. Since the type of this species is lost, I am designating this specimen as the neotype, and depositing it in the United States National Museum collection.

Type localities.—Of *politus*, "Banks of the Mississippi River"; type lost. Of *desertus*, California (Junction of the Colorado and Gila Rivers); type in Museum of Comparative Zoölogy. Of *cupreolus*, Kansas; type in Museum of Comparative Zoölogy. Of *plumbeus*, Lake Superior; type in Museum of Comparative Zoölogy. Of *canadensis*, Canada; type in Obenberger's Collection.

Distribution.—This is the most widely distributed species of *Agrilus* in North America, as specimens have been examined from all parts of southern Canada from the Atlantic to the Pacific Ocean, and from nearly all sections of the United States. It probably will be found wherever willow occurs.

Variations.—This seems to be the most variable North American species of this genus, but it is just possible that when the habits of these insects become better known these variations will represent distinct phytophagic forms. The color varies from golden green to bluish green, and through all shades of reddish cupreous to plumbeus; the elytra are glabrous or sparsely, uniformly clothed with whitish pubescence; the antennae usually have the outer joints wider than long, but occasionally a specimen is found in which they are scarcely wider than long; the head is usually without depressions, but sometimes there are four vague depressions on the front, and a feeble, longitudinal groove on the occiput; and the prosternal lobe is broadly emarginate or subtruncate in front. In some examples the pronotum is widest at the middle, with the sides arcuately rounded, whereas in others it is widest at the apical third, and more obliquely narrowed posteriorly, the depressions are variable in depth, and occasionally the prehumeral carinae are obsolete. Length 4.75 to 8.5 millimeters. The male genitalia are similar in all of the forms examined.

In a large series of adults from Montana the greater number have the elytra uniformly pubescent, whereas in a series reared from maple in Colorado nearly all of the specimens have the elytra practically glabrous. In a very large series reared from willow in California the elytra are either pubescent or glabrous, with all forms of intergrades. In a series of 36 specimens collected by G. A. Harding on willow during May and June, on Vancouver Island, all were of a dark color (none reddish or cupreous), mostly steel blue, with a few olivaceous green or nearly black examples, and the elytra without distinct pubescence.

Hosts.—This species has been reared from dwarf maple (*Acer glabrum* Torrey), striped maple (*Acer pennsylvanicum* Linnaeus), white or arroyo willow (*Salix lasiolepis* Bentham), mountain or Nuttall willow (*Salix scouberiana* Barratt), weeping willow (*Salix babylonica* Linnaeus), Western black willow (*Salix lasiandra* Bentham), and probably will attack all species of willow. It has also been recorded as having been reared from other host plants, but these records are probably from erroneously identified specimens.

The type of *cupreolus* (*politus* No. 11) in the LeConte collection is a female, 9 millimeters in length, and is of a uniform bronzy cupreous color, with a slight reddish tinge, and rather densely, uniformly clothed above and beneath with whitish hairs. The type of *plumbeus* (*politus* No. 16) in the LeConte collection is also a female, measuring 7 millimeters in length, the head and pronotum are dark brown, with a feeble purplish reflection, the elytra are slate colored with a vague greenish tinge, moderately shining, and uniformly clothed with white pubescence similar to *cupreolus*. The type of *desertus* (*politus* No. 23) in the same collection is also a female, 5.75 millimeters in length, above bronzy brown, with a distinct purplish or cupreous tinge, sparsely clothed with white pubescence, but not so densely as in either *cupreolus* or *plumbeus*, and the body beneath is densely clothed with long, white pubescence, which does not obscure the surface. The name *desertus* was previously used by Klug for a species of this genus from Arabia, so Harold (1869) renamed it *solitarius*. Doctor Obenberger has kindly sent me a paratype of his *canadensis* and also a specimen of *politus* (which is subspecies *pseudocoryli* Fisher), with which he compared his *canadensis*. I have compared this paratype with the type of *plumbeus* and can not find any valid characters for separating it from that species, which is a synonym of *politus*.

From our present knowledge of the biology of this species we must consider *politus* a variable species, with the synonymy as given above, but there are two forms which seem to be biologically different, which can be considered as phytophagic subspecies, and which may be separated from *politus* as follows:

1. Male with the inner tooth of anterior and middle claws slightly shorter and broader than the outer one, and slightly turned inward; male with the front of head of the same color as rest of surface. Host: Hazel (*Corylus* sp.)---pseudocoryli Fisher.
   Male with the inner tooth of anterior and middle claws about equal in length and thickness, and not turned inward; male with front of head green-- 2.
2. Color deep blue or bluish green. Host: Alder (*Alnus* sp.)-----burkei Fisher.
   Color green to cupreous or plumbeus. Host: Willow (*Salix* sp.); maple (*Acer* sp.)---politus Say.

AGRILUS POLITUS PSEUDOCORYLI, new subspecies

Agrilus politus Chittenden (not Say), U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68 (part).—Essig, Injurious and Beneficial Ins. of Calif., 1915, p. 234 (part).—Frost, Canad. Ent., vol. 48, 1916, p. 368.—Felt, N. Y. State Mus., Bull. 200, 1918, p. 49.—Frost, Canad. Ent., vol. 52, 1920, p. 28.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 220 (part).—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, pp. 9–10 (part).—Wellhouse, Cornell Agric. Exp. Sta., Mem. 56, 1922, p. 1106 (part).—Hutchings, 53d Rept. Ent. Soc. Ontario, 1923, pp. 44–46, fig.—Champlain and Knull, Canad. Ent., vol. 57, 1925, p. 113 (part).—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 47–48 (part).—Essig, Insects Western North America, 1926, p. 403 (part).—Chamberlin, Cat. Buprestidae, 1926, pp. 77–78 (part).

Agrilus politus var. *corylus* Gibson (not Horn), 48th Rept. Ent. Soc. Ont. for 1917 (1918), p. 112.

Agrilus coryli Knull (not Horn), Canad. Ent., vol. 54, 1922, p. 85.

Male.—This subspecies so closely resembles *politus* that it is deemed necessary merely to give the differences: Head, pronotum and elytra uniformly reddish cupreous, with a violaceous tinge; anterior and middle tarsal claws cleft closer to the middle, the inner tooth shorter and slightly broader than the outer one, and slightly turned inward, but the tips distant, and the elytra are usually more or less constricted near the apex. Genitalia similar to those of *politus* Say.

Female.—Similar to *politus*.

Length, 5.5–7.5 mm.; width, 1.25–1.8 mm.

Type locality.—Lyme, Connecticut.

DISTRIBUTION

Material examined:

CONNECTICUT: Lyme, reared (A. B. Champlain, W. S. Fisher). Somers, June 23, 1926 (M. P. Zappe).
ILLINOIS: La Grange, July 28, 1915 (C. Selinger). Riverside (——).
IOWA: Elma, June 14–30, 1902 (——). Solon, May 14, 1915 (L. L. Buchanan). Iowa City, June 12, 1898 (H. F. Wickham).
KANSAS: Douglas County, June 23 (R. H. Beamer).
MASSACHUSETTS: Sherborn, June 12, 1915 (C. A. Frost). Wilbraham, August 4, 1916 (E. A. Chapin).
MICHIGAN: Detroit (Hubbard and Schwarz).
NEBRASKA: West Point, June, 1888 (L. Bruner).
PENNSYLVANIA: Harrisburg, June 25, 1920 (A. B. Champlain). Hummelstown, reared (Champlain and Knull).
VIRGINIA: Stone Creek, Lee County (Hubbard and Schwarz).
WEST VIRGINIA: French Creek (F. E. Brooks).

Type, allotype, and paratypes.—Cat. No. 41002, U.S.N.M. *Paratypes* also in the collections of W. Knaus, W. J. Chamberlin, C. A. Frost, J. N. Knull, and the University of Kansas.

Described from a large series of adults (one type), from the localities listed above.

This subspecies has been reared from galls on Hazel (*Corylus rostrata* and *Corylus americana*), and the adults have been collected a number of times on these plants, but have been recorded in the literature under *politus*. Obenberger in describing his *canadensis* has misidentified this subspecies as *politus* Say, and probably did not have the true *politus* before him at that time. The males have the genitalia similar to those of *politus*, and can be separated from that species by the characters given above, but it will be difficult to separate the females, as no valid characters were found for differentiating them.

AGRILUS POLITUS subspecies BURKEI Fisher

Agrilus burkei FISHER, Canad. Ent., vol. 49, 1917, pp. 287–289.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 221.—FROST, Canad. Ent., vol. 54, 1922, p. 96.—CHAMBERLIN, Journ. N. Y. Ent. Soc., vol. 32, 1925, p. 194.—ESSIG, Insects Western North America, 1926, p. 403.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 56.

Agrilus sp. BURKE, Journ. Econ. Ent., vol. 10, 1917, pp. 331–332; U. S. Dept. Agric., Bull. 437, 1917, p. 3, pl. 3, figs. 4–6.

Agrilus politus CHAMBERLIN (not Say), Ent. News, vol. 28, 1917, p. 168 (part).—BURKE, Journ. Econ. Ent., vol. 10, 1917, p. 331 (part).—CHAMBERLIN, Journ. N. Y. Ent. Soc., vol. 32, 1925, p. 194 (part).—ESSIG, Ins. Western North America, 1926, p. 403 (part).

Similar to *politus*, except that it is of a deep blue to bluish green color, and moderately shining.

Length, 6–9 mm.; width, 1.75–2.5 mm.

Type locality.—Placerville, California.

DISTRIBUTION

Material examined:

California: Madera County, Chiquito Creek, 4,100 feet, June 27, 1920 (H. Dietrich). Sacramento, July, 1922 (B. G. Thompson). Dunsmuir (H. F. Wickham). Contra Costa County, May 21, 1914 (Leroy Childs). Bair's Ranch, Redwood Creek, Humboldt County, June 12 (H. S. Barber). Shasta County (D. W. Coquillett). Placerville, reared (H. E. Burke).

Canada: Vancouver Island; Victoria (Hubbard and Schwarz).

Nevada: Ormsby County, July (C. F. Baker).

Oregon: La Grange, July 9 (W. J. Chamberlin.)

Wyoming: Medicine Bow, June 23, 1901 (W. Knaus).

Hosts.—This subspecies has been reared by H. E. Burke from normal, injured and dying white alder (*Alnus rhombifolia* Nuttall), and mountain or Poplar-leaf alder (*Alnus tenuifolia* Nuttall).

72. AGRILUS SINUATUS (Olivier)

Figure 53

Buprestis sinuata Olivier, Entomol., vol. 2, gen. 32, 1790. no. 100, p. 74, pl. 10, fig. 111; Enc. Method., vol. 5, 1790, no. 122 p. 237.—Herbst, Nat. Syst. Ins. Käfer, vol. 9, 1801, p. 253, pl. 153, fig. 1.—Latreille, Hist. Nat. Crust. and Ins., vol. 9, 1804, pp. 68–69, no. 56.—Schönherr, Syn. Ins., vol. 1, pt. 3, 1817, p. 245, no. 155.—Sturm, Catal. Ins. Sammlung, 1826, p. 105.—Ratzeburg, Die Forst-Insecten, pt. 1, ed. 2, 1839, p. 64.

Argilus chryseis Curtis, British Ent., vol. 2, 1825, no. 67, pl. 67.

Agrilus sinuatus (Olivier) Solier, Ann. Ent. Soc. France, vol. 2, 1833, p. 305.—Dejean, Cat. Coleopt., ed. 2, 1833, p. 83; ed. 3, 1837, p. 94.—Boisduval and Lacordaire, Faune Ent. Paris, vol. 1, 1835, p. 610, no. 6.—Mannerheim, Bull. Soc. Imp. Nat. Moscou, vol. 10, no. 8, 1837, p. 111.—Castelnau and Gory, Mon. Bupr., vol. 2, 1838, *Agrilus* p. 43, pl. 10, fig. 56.—Sturm, Catal. Käfer Sammlung, 1843, p. 63.—White, Nomenclature Coleopt. Ins. in Brit. Mus., pt. 3, 1848, p. 37.—Redtenbacher, Fauna Austriaca, Käfer, 1849, p. 287.—Kiesenwetter, Naturg. Ins. Deut., vol. 4, 1857, pp. 129–130.—Marseul, L'Abeille, vol. 2, 1866, pp. 445–446.—Gemminger and Harold, Cat. Coleopt., vol. 5, 1869, p. 1445.—Puton, Revue d'Entomologie, vol. 2, 1883, pp. 67–69.—Goethe, Rept. Royal Hort. Acad. Geisenheim for 1890–1891 (1892), pp. 37–41, figs.; Entomol. Nachrichten, vol. 19, 1893, pp. 25–30.—Xambeau, Revue d'Entomologie, vol. 12, 1893, pp. 91–93.—Smith, Ent. News, vol. 5, 1894, pp. 311–312, 323; Garden and Forest, vol. 7, 1894, p. 448; Amer. Agric., vol. 55, 1895, p. 85 figs.; Ent. News vol. 6, 1895, p. 196; N. J. Agric. Exp. Sta., Bull. 109, 1895, pp. 13–24, figs. 4–8: N. J. Agric. Exp. Sta., Ent. Rept. for 1894 (1895), pp. 429–431, 550–561, figs. 37–41.—Howard, Insect Life, vol. 7, 1895, pp. 258–260, fig. 26.—Smith, N. J. Agric. Exp. Sta., Ent. Rept. for 1895 (1896), pp. 368–372.—Webster, Ohio Agric. Exp. Sta., Bull. 77, 1897, pp. 42–45, figs. 5–6.—Lugger, Minn. Agric. Exp. Sta., Bull. 66, 1899, p. 145; Minn. Agric. Exp. Sta., 5th Ann. Ent. Rept., 1899, p. 61, fig. 67.—Beach, Lowe, and Stewart, N. Y. Geneva Agric. Exp. Sta., Bull. 170, 1899, pp. 429–430.—Smith, 27th Ann. Rept. N. J. State Board Agric. for 1899 (1890), suppl. p. 257, fig. 105; N. J. Agric. Exp. Sta., Ent. Rept. for 1899 (1900), pp.

429–430, fig. 3.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—SMITH, N. J. Agric. Exp. Sta., Ent. Rept. for 1900 (1901), pp. 482–483; N. J. Agric. Exp. Sta., Bull. 155, 1902, pp. 29–32; N. J. Agric. Exp. Sta., Ent. Rept. for 1901 (1902), pp. 484–485.—BANKS, U. S. Dept. Agric., Div. Ent., Bull. 34, new ser., 1902, pp. 40–41, figs. 38–39.—FELT, 18th Rept. N. Y. State Ent. for 1902 (1903), p. 122; Proc. 24th Ann. Meet. Soc. Prom. Agric. Sci., 1903, p. 44.—SLINGERLAND, N. Y. Cornell Agric. Exp. Sta., Bull. 234, 1906, p. 75.—FELT, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 504.—(——), Journ. Econ. Ent. vol. 2, 1909, p. 16.—SMITH, N. J. State Board Agric., Rept. 37, 1910, p. 188, fig. 4; Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295; N. J. State Board Agric., Circ. 28 (no date), pp. 1–2.—HEWITT, Canad. Dept. Agric., Expt. Farm, Bull. 12, ser. 2, 1912, p. 17.—WEISS, Journ. Econ. Ent., vol. 7, 1914, p. 251.—BROOKS, U. S. Dept. Agric., Journ. Agric. Research, vol. 3, 1914, p. 184.—SLINGERLAND and CROSBY, Manual Fruit Ins., 1914, pp. 230–232, figs. 209–210.—PARROTT and GLASGOW, N. Y. State Agric. Exp. Sta., Cir. 44, 1915, pp. 1–2, pl. 1.—GLASGOW, Journ. Econ. Ent., vol. 8, 1915, p. 15.—PARROTT, N. Y. State Dept. Agric., Bull. 79, 1916, pp. 1019–1021, fig. 301; N. Y. Geneva Agric. Exp. Sta., Circ. 51, 1916, p. 3. fig.; 15th Proc. N. Y. State Fruit Growers Assoc., 1916, p. 197; 61st Proc. West N. Y. Hort. Soc., 1916, pp. 120–121, pl. 1, figs. 1–3.—SCHAUFUSS, Calwer's Käferbuch, vol. 1, 1916, ed. 6, p. 702.—FELT, N. Y. State Mus., Bull. 186, 1916, pp. 78–79, 95.—PARROTT, 35th Ann. Rept. N. Y. Geneva Agric. Exp. Sta., for 1916 (1917), pp. 453–454, fig. 25.—GLASGOW, Journ. Econ. Ent., vol. 10, 1917, pp. 59–60.—PIERCE, U. S. Dept. Agric., Man. Dangerous Ins., 1917, pp. 5, 169.—WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 24, 1918, pp. 5–8, figs. 2–3.—FELT, N. Y. State Mus., Bull. 200, 1918, p. 134.—WASHBURN, Injurious Insects, 1918, p. 108.—BRITTON, Proc. 27th Ann. Meet. Conn. Pomological Soc., 1918, p. 47; Conn. Agric. Exp. Sta., Bull. 203, 1918, p. 361.—HEADLEE, COOK and WEISS, N. J. Dept. Agric., Bull. 22, 1919, p. 107.—DREW, Proc. 29th Ann. Meet. Conn. Promological Soc., 1920, p. 104.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 221.—BRITTON, Conn. Agric. Exp. Sta., Bull. 226, 1921, pp. 193–196, fig. 11.—KNULL, Canad. Ent., vol. 54, 1922, p. 85.—WELLHOUSE, N. Y. Cornell Agric. Exp. Sta., Mem. 56, 1922, p. 1108.—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, pp. 11–12; fig. 8.—PARROTT, N. Y. Dept. Farms and Markets, Bull. 147, 1923, pp. 161–162.—WALKER, Ent. Monthly Mag., vol. 61, 1925, p. 183.—KNULL, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 47, pl. 1, fig. 23.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 82.—BRITTON, Conn. Agric. Exp. Sta., Bull. 285, 1927, p. 168.

Agrilus sp. SMITH, Ent. News, vol. 5, 1894, p. 252.

Agrilus acutipennis SMITH (not Mannerheim) Insect Life, vol. 7, 1894, pp. 189–191; Garden and Forest, vol. 7, 1894, pp. 373–374, fig. 60.

Agrilus anxius SMITH (not Gory), Canad. Ent., vol. 26, 1894, p. 272.
(Bibliography not complete for the European literature.)

Male.—Moderately elongate, strongly attenuate posteriorly, moderately convex, and feebly shining; head bronzy green in front; pronotum and elytra reddish cupreous, with a violaceous tinge; beneath the prosternum is bronzy brown and opaque, rest of surface strongly bronzy, with a more or less cupreous tinge, and more shining than above.

Head with the front wide, nearly flat, slightly wider at top than at bottom, the lateral margins broadly, arcuately expanded at vertex, with a narrow, longitudinal groove extending from the occiput to middle of front, and narrowly, transversely depressed behind the epistoma; surface densely, coarsely punctate, coarsely rugose, the rugae more distinct posteriorly, and rather densely clothed with long, erect, inconspicuous hairs; epistoma feebly transverse between the antennae, strongly elevated, and with a semicircular emargination in front; antennae extending to basal third of pronotum, serrate from the fourth joint, and the outer joints slightly longer than wide; eyes large, rather narrowly oblong, and slightly more broadly rounded beneath than above.

Pronotum about one-half wider than long, about equal in width at base and apex, and widest at middle; sides arcuately expanded to middle, then strongly, sinuately narrowed to near the posterior angles, where they are parallel; when viewed from the side the marginal carina is slightly sinuate anteriorly, the submarginal carina straight, and the two carinae connected to each other near the base; anterior margin strongly sinuate, with the median lobe broadly rounded; base strongly emarginate at the middle of each elytron, the median lobe broadly rounded, and truncate in front of scutellum; disk moderately convex, broadly, obsoletely, transversely depressed in front of middle and toward the base, a broad, shallow depression on each side along lateral margin, extending from middle to base, and with a distinct, arcuate prehumeral carina, extending from base to near the middle; surface densely, finely, transversely rugose, finely, densely punctate between the rugae, and clothed with a few short, inconspicuous hairs. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra distinctly wider than pronotum at base, and slightly wider at base than behind the middle; sides nearly parallel for a short distance behind the base, feebly, arcuately constricted in front of middle, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and strongly serrulate; sides of abdomen narrowly exposed above; disk moderately convex, and with broad, deep basal depressions; surface finely, densely imbricate-punctate, and without distinct pubescence.

Abdomen beneath finely, densely punctate, the punctures connected transversely by more or less distinct sinuate lines toward the sides, more coarsely on the basal segment, and rather densely, uniformly clothed with short, recumbent, whitish hairs; first segment feebly convex, without a median groove; last segment broadly rounded at apex; vertical portions of segments not conspicuously pubescent; pygidium strongly carinate, but the carina not projecting. Prosternum densely, finely granulose, with numerous small asperities, and rather densely clothed with short, erect, inconspicuous hairs; prosternal lobe broad, strongly declivous, and with a deep semicircular emargination in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is rather acute. Tibiae slender, straight, and the anterior and middle pairs with a small tooth on the inner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following three joints united. Tarsal claws dissimilar, anterior and middle ones cleft near the tip, and the teeth acute and nearly equal in length; posterior pair cleft near the middle, the inner tooth broad, much shorter than the outer one, and not turned inward.

Female.—Differs from the male in being more robust, head reddish cupreous, with a violaceous tinge, front of head slightly broader, about equal in width at top and bottom, the lateral margins more parallel, and the surface not quite so densely pubescent; antennae extending to middle of pronotum; eyes equally rounded above and beneath, and the tarsal claws similar on all feet, cleft near the middle, the inner tooth shorter than the outer one, and feebly turned inward, but the tips widely separated.

Length, 7.25–9.25 mm.; width, 1.8–2.75 mm.

Redescribed from specimens collected at Newark, N. J.

Type locality.—Of *sinuatus*, France, " Provence " (an old province in the southeastern part, now forming the departments of Bouches du-Rhone, Basses-Alpes, and eastern part of Vaucluse); present location of type unknown to writer. Of *chryseis*, England (between Brockenhurst and Bottomsley, Hampshire); present location of type unknown to writer.

DISTRIBUTION

Southern Europe and Algeria. In the United States:

CONNECTICUT: Norwalk, Stamford, Greenwich, and New Haven (W. E. Britton).
NEW JERSEY: Local in Essex, Union, Middlesex, Bergen, and Monmouth counties (J. B. Smith and H. B. Weiss).
NEW YORK: Southeastern part, in 5 or 6 counties contiguous to the Hudson River (Parrott and Glasgow).

Variations.—None worthy of note, except size, has been observed in the specimens examined.

Host.—In the United States the larva bores in the sapwood of cultivated pear (*Pyrus communis* Linnaeus), causing serious injury and requires two years to mature. It is also recorded as breeding in thorn (*Crataegus* sp.). Chamberlin (1926) records red oak (*Quercus rubra* Linnaeus), but this is probably incorrect.

This species was first discovered in this country in 1894, at Irvington, N. J., where it was causing serious injury to pear trees and was probably introduced about 1884 in pear stock from France or Germany. At first it was identified as probably *anxius* Gory or *acutipennis* Mannerheim, but during the latter part of the same year it was identified by J. B. Smith as *sinuatus*, a European species not before recorded from this country, but which is very injurious to pear trees in Europe. The "Sinuate pear-tree borer" has been adopted as the common name for this pest by the Association of Economic Entomologists.

73. AGRILUS COERULEUS (Rossi)

Figure 54

Buprestis coeruleus Rossi, Fauna Etrusca, vol. 1, 1790, p. 407, no. 151.—Herbst, Nat. Syst. Ins., Käfer, vol. 9, 1801, p. 251, pl. 155, figs. 10*a*, 10*b*.

Agrilus coeruleus (Rossi) Kiesenwetter, Naturg. Ins. Deut., vol. 4, 1857, pp. 140–141.—Marseul, L'Abeille, vol. 2, 1866, pp. 452–453.—Schaufuss, Calwer's Käferbuch, vol. 1, 1916 (6th ed.) p. 701, pl. 20, fig. 27.—Mokrzecki, Troodove na Blg. Prir. D- vo, Sofia, 1921, pp. 117–126, fig. (Publication not seen. From Rev. Appl. Ent., vol. 10, 1922, p. 92.)—Frost, Canad. Ent., vol. 54, 1922, p. 96.—Chamberlin, Cat. Buprestidae, 1926, p. 57.

Agrilus cyaneus Castelnau and Gory (not Olivier), Mon. Bupr., vol. 2, 1838, *Agrilus* p. 52, pl. 11, fig. 66.

Agrilus amabilis Castelnau and Gory, Mon. Bupr., vol. 2, 1838, *Agrilus* pp. 52–53, pl. 12, fig. 67.

Buprestis cyanescens Ratzeburg, Die Forst-Insecten, pt. 1, ed. 1, 1837, ed. 2, 1839, pp. 61–62, pl. 2, fig. 2.

Agrilus cyanescens (Ratzeburg) Redtenbacher, Fauna Austriaca, Käfer, 1849, p. 285.

Agrilus sulcaticeps Abeille, Petites Nouvelles Entomologiques, vol. 1, 1869, no. 11.

(Bibliography not complete for the European literature.)

Male.—Form short, rather robust, slightly convex above, feebly shining, uniformly dark blue to greenish blue, and sometimes with the head feebly aeneous; beneath black to bluish black and slightly more shining than above.

Head with the front rather wide, feebly convex, slightly wider at top than bottom, the lateral margins obliquely expanded from bottom to top, with a deep, narrow, transverse groove behind the antennal cavities, a more or less distinct, broad, median depression on front, and usually with a broad, feeble, longitudinal depression extending from occiput to middle of front; surface obsoletely granulose, coarsely, confluently punctate, more or less rugose, especially on occiput, and glabrous; epistoma slightly transverse between the antennae, wider in front than behind, the lateral margins strongly elevated, and broadly, feebly emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints as wide as long; eyes rather large, rather narrowly oblong, and equally rounded above and beneath.

Pronotum one-half wider than long, about equal in width at base and apex, and widest near apical third; sides arcuately rounded from apical angles to near middle, then more strongly narrowed to the posterior angles; when viewed from the side the marginal and submarginal carinae are feebly sinuate, widely separated anteriorly, and the submarginal carina becoming obsolete behind middle; anterior margin rather strongly sinuate, and the median lobe broadly, arcuately rounded; base strongly, arcuately emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk feebly convex, with a more or less distinct, median depression in front of scutellum, a broad, moderately deep depression on each side along lateral margin extending to base, and with an elongate elevation in place of the prehumeral carina; surface densely, deeply rugose, the rugae more or less transverse on the disk, and sparsely, finely punctate between the rugae. Scutellum moderately, transversely carinate, and the surface densely, finely reticulate.

Elytra slightly wider than pronotum at base and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted in front of middle, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, very broadly rounded and vaguely serrulate; sides of abdomen narrowly exposed above; disk slightly convex, sutural margins slightly elevated posteriorly and with broad, moderately deep basal depressions; surface densely, finely imbricate-punctate and without distinct pubescence.

Abdomen beneath densely granulose, finely, sparsely punctate, becoming transversely rugose on basal segment, and sparsely clothed with short, inconspicuous hairs, which are longer and more distinct along posterior margin of last segment; first segment feebly flattened at middle, and the suture between first and second segments not distinct at sides; last segment broadly rounded at apex; vertical portions of segments not pubescent and the fourth segment longitudinally carinate; pygidium coarsely punctate, strongly carinate, but the carina not projecting. Prosternum densely granulose, sparsely scabrous, and nearly glabrous; prosternal lobe broad, strongly declivous, and deeply, broadly, arcuately emarginate in front, and the sides of the emargination forming an acute angle; prosternal process broad, nearly parallel to behind coxal cavities, or at most only vaguely expanded, then obliquely narrowed to the apex, which is acute. Tibiae slender and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near middle, the inner tooth much shorter than outer one and not turned inward.

Female.—Very similar to male, but differs from it in being slightly more robust, first abdominal segment more convex, and the tibiae unarmed at apex.

Length, 5.5–6.25 mm.; width, 1.75–2 mm.

Type localities.—Of *coeruleus*, Italy ("Provinces of Florence and Pisa, Etruria"). Of *cyaneus*, Europe. Of *amabilis*, Germany (Saxony). Of *cyanescens*, Germany. Of *sulcaticeps*, France (Basses Alpes). The present location of the types of all the species listed above are unknown to the writer.

DISTRIBUTION

In Europe: Austria, Bulgaria, France, Germany, Italy, Portugal, and Spain.

In the United States:

MASSACHUSETTS: Sherborn, May 28, 1921 (C. A. Frost).
WISCONSIN: Sturgeon Bay, July 26, 1920 (Charles L. Fluke).

Variations.—None worthy of mention was observed in the few specimens examined.

Host.—Nothing is known of the larval habits of this species in America. In Europe Schaufuss (1916) records the larvae as living in *Lonicera nigra*, oak, birch, beech, and alder. Mokrzecki (1921) records the larva as living under the bark of roses (*Rosa* sp.) in Bulgaria, and are more or less injurious to these plants.

This species was probably introduced into this country from Europe, where it is recorded as not being rare. Its occurrence in this country was first recorded by C. A. Frost (1922), from material collected by Charles L. Fluke, at Sturgeon Bay, Wis., who reported it very abundant flying around the wild raspberry bushes, and later a specimen was collected by C. A. Frost, while sweeping weeds and grasses in a pasture near Sherborn, Mass. These specimens have been compared with specimens received from Europe as *coeruleus*, and no differences could be found. This species will probably be confused in collections with the bluish forms of *politus*, but can be separated from that species by having the outer joints of antennae as long as wide.

74. AGRILUS CRATAEGI Frost

Figure 55

Agrilus crataegi FROST, Canad. Ent., vol. 44, 1912, pp. 247–248.—KWIAT, Ent. News, vol. 26, 1915, p. 237.—FROST, Canad. Ent., vol. 52, 1920, p. 251.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 222.—KNULL, Canad. Ent., vol. 54, 1922, p. 85; Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 48.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 57.

Agrilus politus Felt (not Say), N. Y. State Mus., Bull. 200, 1918, p. 135.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 220 (part).—Mutchler and Weiss, N. J., Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, pp. 9–10 (part).—Wellhouse, Cornell Agric. Exp. Sta., Mem. 56, 1922, p. 1106 (part).

Male.—Form rather slender, elongate. and feebly flattened above; head green in front, becoming brownish cupreous on the occiput; pronotum and elytra olivaceous bronze, suffused with cupreous, becoming distinctly reddish cupreous on apical third of elytra, and moderately shining; beneath reddish cupreous, the legs more aeneous, and more shining than above.

Head with the front rather wide, nearly flat, slightly wider at top than at bottom, the lateral margins nearly parallel from the top to middle, then broadly constricted to the bottom, with a distinct longitudinal groove extending from the occiput to middle of front, and ending in a slight depression; surface finely, densely granulose, rather densely, coarsely punctate, longitudinally rugose on the occiput, and rather densely clothed with moderately long, recumbent, whitish hairs anteriorly; epistoma strongly transverse between the antennae, and broadly, rather deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes large, broadly elongate, and about equally rounded above and beneath.

Pronotum one-half wider than long, about equal in width at base and apex, and widest along apical half; sides nearly parallel from apical angles to near middle, then vaguely narrowed to the posterior angles which are rectangular; when viewed from the sides the marginal and submarginal carinae are sinuate, rather narrowly separated anteriorly, and connected to each other near the base; anterior margin feebly sinuate, with the median lobe broadly rounded; base strongly emarginate at middle of each elytron, the median lobe broadly truncate in front of scutellum; disk moderately convex, with two broad, moderately deep median depressions, a broad, moderately deep depression on each side along lateral margin, and with long, nearly straight, sharply defined prehumeral carinae, extending from base to middle of pronotum; surface obsoletely reticulate, densely, transversely rugose, finely, sparsely punctate between the rugae, and with a few indistinct hairs in the depressions. Scutellum transversely carinate, and the surface finely, densely reticulate.

Elytra wider than pronotum at base, and about equal in width at base and behind the middle; sides feebly rounded behind the base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and finely serrulate; sides of abdomen only feebly exposed above; disk feebly convex, without distinct longitudinal costae, sutural margins slightly elevated posteriorly, and with broad, moderately deep basal depressions; surface densely, coarsely imbricate-punctate, and with a few inconspicuous hairs in the basal depressions.

Abdomen beneath obsoletely reticulate, densely, coarsely, imbricate-punctate on basal segment, becoming finely, sparsely, punctate, and more or less imbricate on the other segments, and sparsely, uniformly clothed with short, recumbent, white hairs; first segment feebly flattened, and without a median groove; last segment broadly rounded at apex; vertical portions of segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, feebly carinate, but the carina not projecting. Prosternum finely, densely punctate and granulose, and densely clothed with long, erect, very fine hairs at the middle, extending to anterior part of mesosternum; prosternal lobe broad, moderately declivous, and broadly but not deeply emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, anterior pair slightly arcuate, and all pairs armed with a small tooth on inner margin at apex. Posterior tarsi nearly subequal in length to the tibiae, and the first joint about as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth slightly shorter than the outer one, and not turned inward.

Length, 6 mm.; width, 1.5 mm.

Female.—Differs from the male in having the head entirely cupreous, about equal in width at top and bottom, lateral margins nearly parallel, the surface more sparsely punctate, not granulose, not so distinctly pubescent behind the epistoma, and the median, longitudinal groove more broadly depressed; eyes slightly more acutely rounded beneath than above; posterior tarsi distinctly shorter than tibiae; tibiae without a distinct tooth at apex, and the prosternum without long, erect pubescence at the middle.

Redescribed from the male holotype in the collection of C. A. Frost.

Type locality.—Harrisburg, Pa.

DISTRIBUTION

Material examined:

CANADA: Alberta, Medicine Hat, June 28, 1924 (F. S. Carr).

ILLINOIS: Edgebrook, June 12–July 17; Riverside, June 29 (E. Liljeblad). Elgin, July 4–17, 1920 (M. Bristol). Galesburg (——).

IOWA: Elma, June 14–30, 1902 (——). Ames, June 26, 1916 (L. S. Wells).

PENNSYLVANIA: Harrisburg, reared (Fisher and Kirk); June (Champlain and Knull). Charter Oak, June 22; Hummelstown, June 5 (J. N. Knull). Chinchilla, July 2 (——).

Frost (1920) also records it having been taken in Virginia during June by Nathan Banks (probably near Falls Church). The Highspire, Pa., record given by Chamberlin (1926) is an error.

Variations.—The color above is somewhat variable in different lights, varying from a reddish cupreous to an olivaceous bronze, with a more or less reddish reflection, and occasionally is sparsely clothed with very short, inconspicuous hairs. The sides of the pronotum are usually nearly parallel to each other along the apical half, but sometimes the pronotum is widest at the middle, with the sides regularly, arcuately rounded. Length 6 to 8 millimeters.

Host.—Reared from thorn (*Crataegus* sp.) by W. S. Fisher and H. B. Kirk.

75. AGRILUS CEPHALICUS LeConte

Figure 56

Agrilus cephalicus LeConte, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 249.—Pettit, Canad. Ent., vol. 4, 1872, p. 99.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 336.—Frost, Canad. Ent., vol. 44, 1912, pp. 248–250. (Redescription).—Johnson, Ent. News, vol. 27, 1916, p. 117.—Gibson, 48th Rept. Ent. Soc. Ontario for 1917 (1918), p. 112.—Knull, Ent. News, vol. 31, 1920, p. 10.—Britton, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 244.—Frost, Canad. Ent. vol. 52, 1920, p. 28.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 210.—Knull, Canad. Ent., vol. 54, 1922, p. 85.—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 8.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 48–49, pl. 1, figs. 20, 29, 30.—Chamberlin, Cat. Buprestidae, 1926, p. 60.—Criddle, 57th Rept. Ent. Soc. Ontario for 1926 (1927), p. 54.

Agrilus otiosus Stromberg, Canad, Ent., vol. 26, 1894, p. 36 (part).—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, pp. 65–66, 68, (part).—Felt, N. Y. State Mus., Bull. 180, 1916, p. 117.—Frost and Weiss, Canad. Ent., vol. 52, 1920, pp. 205–206 (part).—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 9 (part).—Felt, 35th Rept. N. Y. State Ent. for 1921 (1923), p. 90 (part).

Agrilus sp. Hopkins, Insect Life, vol. 4, 1892, p. 258; W. Va. Agric. Exp. Sta., Bull. 32, 1893, p. 184, (sp. c.); Insect Life, vol. 7, 1894, p. 198 (part).

Female.—Form slender, similar to *otiosus*, slightly flattened above, and moderately shining; head uniformly brownish cupreous; pronotum and elytra brownish cupreous, and the former feebly aeneous toward the sides; beneath piceous, with a feeble greenish tinge, and more shining than above.

Head with the front broad, nearly flat, about equal in width at top and bottom, the lateral margins feebly, arcuately expanded at vertex, and with a more or less distinct, broad, longitudinal depression extending from occiput to middle of front; surface finely, sparsely punctate, slightly rugose, the rugae irregular on front but becoming longitudinal on the occiput, and clothed with a few short, white hairs behind the epistoma; epistoma transverse between the antennae, and broadly but not deeply, arcuately emarginate in front; antennae extending nearly to middle of pronotum, serrate from the fourth joint, and the outer joints about as wide as long; eyes large, elongate, and about equally rounded above and beneath.

Pronotum nearly one-third wider than long, slightly narrower at base than apex, and widest near middle; sides arcuately rounded from apical angles to near posterior angles, where they are nearly parallel to each other; when viewed from the sides the marginal and submarginal carinae are feebly sinuate, and narrowly separated for their entire length; anterior margin slightly sinuate, and the median lobe broadly rounded; base slightly emarginate at middle of each elytron, the median lobe broadly rounded, but feebly produced in front of scutellum; disk moderately convex, with two round, moderately deep median depressions, a broad, deep, oblique depression on each side along lateral margin at middle, and with very strongly elevated prehumeral carinae; surface finely, densely granulose, more or less transversely, coarsely rugose, finely, sparsely punctate between the rugae, and clothed with a few short, indistinct hairs. Scutellum strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind the middle; sides nearly parallel for a short distance behind base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrow to the tips, which are separately, broadly rounded, and finely serrulate; sides of abdomen feebly exposed above; disk slightly flattened, without a distinct longitudinal costa, the sutural margins strongly elevated posteriorly, and with broad, moderately deep, basal depressions; surface densely, coarsely imbricate-puncture, and nearly glabrous.

Abdomen beneath obsoletely granulose, sparsely, finely punctate, more densely on basal segment, and sparsely, uniformly clothed with short, recumbent, whitish hairs; first segment feebly flattened, and without a median depression; last segment broadly rounded at apex; vertical portions of segments not conspicuously pubescent; pygidium coarsely, sparsely punctate, but not carinate. Prosternum finely, sparsely punctate, and sparsely clothed with short, recumbent, whitish hairs; prosternal lobe broad, rather strongly declivous, and broadly but not deeply emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, nearly straight, and without a distinct tooth at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Length, 5.75 mm.; width, 1.5 mm.

Male.—Differs from the female in having the head blue or bluish green, becoming aeneous or cupreous on the occiput, front slightly narrower, slightly wider at top than at bottom, the lateral margins more strongly expanded, and the surface densely, finely granulose, and densely clothed with long, recumbent, silvery white pubescence behind the epistoma; antennae extending to middle of pronotum; abdomen not exposed above; sides of pronotum more greenish; prosternum densely clothed at middle with long, erect, fine hairs, extending to the middle of the first abdominal segment; all tibiae armed with a short tooth on inner margin at apex; posterior tarsi slightly shorter than tibiae; and the legs usually greenish or bluish.

Redescribed from the female cotype (*egenus* No. 11) in the Museum of Comparative Zoology.

Type locality.—District of Columbia.

DISTRIBUTION

Material examined:

Connecticut: Lyme, reared (A. B. Champlain). North Branford, June 2–8 (B. H. Walden and M. P. Zappe). Hamden, June 20 (B. H. Walden).

District of Columbia: Rock Creek Park, June 20 (C. E. Burden).

Illinois: Algonquin (Nason). Galesburg, July 9, 1892 (Stromberg).

Indiana: Lafayette, June 21, 1907 (——).

Iowa: Iowa City, June 25, 1915 (Stoner).

Kansas: Coffey County, June (W. J. Brown). Douglas County (F. H. Snow). Leavenworth County, July 1, 1924 (R. H. Beamer).

Kentucky: Frankfort, June 9, 1889 (H. Soltau).

Louisiana: Covington, May 28 (H. Soltau).

Maryland: Riverside, June (D. H. Blake).

Massachusetts: Sherborn (C. A. Frost).

Michigan: Grand Ledge (Hubbard and Schwarz).

Minnesota: Gull Lake, June 25. 1925 (F. M. Uhler).

Mississippi: Vicksburg (T. L. Casey).

Nebraska: Nebraska City, June (——).

New Jersey: New Brunswick, June 15 (A. S. Nicolay).

New York: Hartsdale, reared (M. N. Peck). Staten Island (M. L. Linell). Olcott, June 5–20 (H. Dietrich). Peekskill, June (Stromberg). Trivoli, May 27, 1921; Poughkeepsie, May 9–June 1 (——).

North Carolina: Tryon, reared (W. F. Fiske). Southern Pines, June 14, 1916 (A. H. Manee).

Ohio: No definite locality.

Oklahoma: Atoka (H. F. Wickham).

Pennsylvania: Inglenook, June 9, 1911; Highspire, June 12–20 (W. S. Fisher). Hummelstown, June 6–10; State College, June 9; York (J. N. Knull). Jeannette (H. G. Klages).

Texas: No definite locality.

Virginia: Veitch, and Falls Church, reared (F. C. Craighead). Shipman (H. E. Burke). Chain Bridge, June 5 (J. C. Bridwell).

West Virginia: Wood and Monongahela Counties (A. D. Hopkins).

It has also been recorded from Onah, Manitoba; Grimsly, Ontario, and Medicine Hat, Alberta.

Variations.—This species varies in color from a uniform dark cuperous brown to nearly black, with the pronotum of various shades of bronzy green. The sides of the pronotum show considerable variation in shape, and the length varies from 4.5 to 5.75 millimeters.

Host.—Although the adults have been collected on various plants, the larvae seem to be restricted to the dogwood (*Cornus florida* Linnaeus), as the species has been reared a number of times by different workers from this host plant.

This species resembles *otiosus* Say and *egenus* Gory very closely. but it can be distinguished from *otiosus* and the allied species by having the tarsal claws broadly toothed and the inner tooth not turned inward. It can be separated from *egenus* by having the antennae serrate from the fourth joint, whereas in that species they are serrate from the fifth joint. *Agrilus cephalicus* was suppressed as a synonym of *egenus* by Horn (1891) without any explanation, and it is entirely unwarranted. In making an examination of the material in the LeConte collection, numbers 3, 5, 11, and 16 in the *egenus* series were found to be *cephalicus*, of which number 11 bears the label "*cephalicus* LeC." Chamberlin (1926) considers it a variety of *egenus*, but it is a valid species as shown by the antennal characters.

76. AGRILUS STRIGICOLLIS Fall

Figure 57

Agrilus strigicollis Fall, Canad. Ent., vol. 44, 1912, pp. 41–42.—Chamberlin, Cat. Buprestidae, 1926, p. 83.

Female.—Form moderately robust, rather strongly flattened above, moderately shining, and uniformly aeneous, with a distinct cupreous tinge, which is slightly more pronounced on pronotum and head; beneath similar to above, but slightly more shining.

Head with the front rather wide, about equal in width at top and bottom, the lateral margins nearly parallel to each other from bottom to top, with a broad, deep concave depression on upper half, which is connected to a shallow, transverse depression behind the epistoma by a deep, longitudinal median depression, causing a round gibbosity on each side below the middle; surface coarsely, closely punctate, the punctures uniting in some places and forming coarse rugae, and sparsely clothed behind the epistoma with long, white hairs; epistoma slightly transverse between the antennal cavities, moderately elevated, and broadly, deeply, arcuately emarginate in front; antennae scarcely extending to middle of pronotum, serrate from the fifth joint, and the outer joints wider than long; eyes rather large, broadly elongate, and equally rounded above and beneath.

Pronotum about one-fifth wider than long, about equal in width at base and apex, and widest near apical third; sides feebly obliquely expanded from posterior angles to apical third, then arcuately narrowed to the apical angles; when viewed from the side the marginal and submarginal carinae are strongly sinuate, rather broadly separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base feebly, transversely sinuate to middle of each elytron, and with a very broadly rounded median lobe; disk moderately convex, median line rather deeply depressed throughout, the depression broader and deeper posteriorly, with a shallow depression on each side along lateral margin, and with a vague, obtuse elevation in place of the prehumeral carina; surface coarsely, deeply, but not very closely rugose, the rugae wavy and transverse at the middle, but becoming longitudinal toward the sides, sparsely, finely punctate between the rugae, and clothed with a few inconspicuous hairs. Scutellum deeply depressed, but not transversely carinate, and the surface densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly, vaguely constricted in front of middle, feebly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and finely serrulate; sides of abdomen feebly exposed above; disk slightly flattened along suture, and forming a vague longitudinal costa on each side, the sutural margins rather strongly elevated posteriorly, and with broad, shallow basal depressions; surface densely, coarsely imbricate-punctate, and sparsely, uniformly clothed with short, recumbent, whitish hairs.

Abdomen beneath finely, obsoletely granulose, rather coarsely, moderately punctate, and moderately clothed with short, recumbent, white hairs; first segment convex, and without a depression at middle; last ventral segment with a small emargination at apex; vertical portions of segments not conspicuously pubescent; pygidium without a projecting carina. Posternum densely, coarsely punctate, coarsely rugose, and sparsely clothed with rather long, semierect, white hairs; posternal lobe broad, moderately declivous, and broadly truncate or vaguely, broadly emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, and without a tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint about as long as the following three joints united.

Tarsal claws similar on all feet, cleft near the middle, the teeth nearly equal in length, the inner one turned inward, and the tip nearly touching that of the opposite side.

Length, 9 mm.; width, 2.4 mm.

Male.—Differs from the female in having the antennae extending to middle of pronotum and the outer joints about as wide as long; prosternum densely clothed with long, erect, whitish hairs; anterior and middle tibiae armed with a short tooth on inner margin at apex; tarsal claws nearly similar on all feet, cleft near the middle, the inner tooth nearly as long as the outer tooth, moderately turned inward, and their tips nearly equally separated from each other and the outer tooth of the claw.

Redescribed from the female holotype in the collection of H. C. Fall.

Type locality.—Huachuca Mountains, Ariz.

DISTRIBUTION

ARIZONA: Huachuca Mountains (female holotype) July 14. 1910 (Carl R. Coolidge). Santa Rita Mountains, male (M. Chrisman).

Variation.—None observed in the two specimens examined.

Host.—Unknown.

This species seems to be rare in collections, as only two specimens have been seen. In general appearance it resembles *lacustris* LeConte, but it can at once be separated from any of the known species of the genus by the combination of antennal and tarsal claw characters, as no other species with the antennae serrate from the fifth joint has the inner tooth of the tarsal claws turned inward.

77. AGRILUS GIBBICOLLIS Fall

Figure 58

Agrilus gibbicollis FALL, Calif. Acad. Sci., Occasional Papers, no. 8, 1901, p. 241.—FALL and COCKERELL, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 181.—WOODWORTH, Guide to California Insects, 1913, p. 195.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 63.

Agrilus mercurius WICKHAM, Canad. Ent., vol. 35, 1903, pp. 70–71 (new synonymy).—FALL and COCKERELL, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 181.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 70.

Female.—Form robust, subcylindrical, feebly shining, and bronzy cupreous; pronotum and elytra with longitudinal vittae of yellowish white pubescence; beneath similar in color to above but more shining.

Head with the front rather wide, only vaguely wider at top than bottom, the lateral margins nearly parallel to each other, and with a more or less distinct groove on the occiput and vertex; surface densely, coarsely punctate, somewhat rugose, and densely clothed with long, recumbent, brownish yellow pubescence, which nearly conceals the sculpture on the front and vertex; epistoma slightly transverse between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending nearly to middle of pronotum, serrate from the fifth joint, and the outer joints as wide as long; eyes moderately large, strongly oblong, and equally rounded above and beneath.

Pronotum slightly wider than long, slightly narrower at base than apex, and widest near apical third; sides arcuately rounded from apical angles to behind middle, then more obliquely narrowed to near the posterior angles, where they are strongly sinuate; posterior angles prominent and slightly acute; when viewed from the side the marginal carina is sinuate, very strongly, arcuately deflexed anteriorly, the submarginal carina slightly sinuate, and the two carinae widely separated at apical fourth, but connected to each other at apex and near base; anterior margin feebly sinuate, and with a prominent, broadly rounded, median lobe; base transversely sinuate, with the median lobe broadly rounded, and subtruncate in front of scutellum; disk strongly convex in front, gibbous when viewed in profile, the basal half broadly, transversely depressed, the depression extending along the lateral margins to apical fourth, and with feebly indicated, vaguely sinuate, prehumeral carinae, extending from base to middle of lateral depressions; surface coarsely, concentrically rugose, sparsely clothed with short, recumbent whitish hairs, and on each side a narrow, longitudinal vitta of rather densely placed, recumbent, yellowish white hairs, extending from base to middle of elytron forward to posterior margin of gibbosity, then obliquely outward to the apical angles. Scutellum not transversely carinate, but the surface more or less reticulate.

Elytra about as wide as pronotum at base, and equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted near middle, broadly expanded behind middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and feebly serrulate; sides of abdomen very broadly exposed above; disk feebly, longitudinally depressed along sutural margins, which are feebly elevated posteriorly, and with broad, shallow basal depressions; surface coarsely imbricate-punctate, sparsely, uniformly clothed with short, inconspicuous hairs, and each elytron ornamented with a longitudinal vitta of rather densely placed, recumbent, yellowish white hairs, extending along sutural depression from apex to basal depression.

Abdomen beneath sparsely, coarsely punctate, becoming more or less transversely rugose at sides of basal segments, rather densely clothed with moderately long, recumbent, yellowish white pubescence, and with a longitudinal vitta of more densely placed, silvery white hairs on each side of the middle; vertical portions of the segments densely clothed with short, whitish pubescence; first segment convex at middle; pygidium not distinctly carinate at middle. Prosternum coarsely, rather densely rugose and punctate, and rather densely clothed with moderately long, recumbent, whitish hairs; prosternal lobe broad, strongly declivous, and broadly rounded in front; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then feebly narrowed to the apex. Tibiae slender, straight, and unarmed at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint about as long as the following two joints united. Tarsal claws similar on all feet, cleft near middle, the inner tooth distinctly shorter than outer one, and not turned inward.

Length, 7.4 mm.; width, 2.1 mm.

Male.—Differs from the female in having the head narrower in front, and usually more densely pubescent; antennae extending to middle of pronotum, and the outer joints vaguely longer than wide; prosternum densely clothed with long, erect, whitish hairs; first abdominal segment feebly, broadly, longitudinally concave at middle; anterior and middle tibiae armed with a short tooth on inner margin at apex; posterior tarsi slightly shorter than tibiae, and the tarsal claws dissimilar, anterior and middle claws cleft near the tip, the teeth acute and nearly subequal in length, posterior claws cleft near middle, the inner tooth broad, shorter than outer one, and not turned inward.

Redescribed from the type (female) in the collection of Dr. A. Fényes.

Type localities.—Of *gibbicollis*, San Bernardino, Calif. Of *mercurius*, Deming, N. Mex.; type in collection of H. F. Wickham.

DISTRIBUTION

Material examined:

ARIZONA: Flagstaff, July 3 (Barber and Schwarz). Southern part, August, 1902 (F. H. Snow). Indian Gardens, Grand Canyon, July 13 (H. F. Wickham).

CALIFORNIA: San Bernardino, June, 1897 (A. Fényes). San Diego County (H. C. Fall). Independence, July 17 (H. F. Wickham).

NEW MEXICO: Deming, July 18–August 18 (H. F. Wickham). Roswell, July 23, 1925 (Rehn and Hebard). Magdalena (Strickler). Koehler, July 23 (D. J. Caffrey). Magdalena Mountains, August, 1894; Socorro County, August, 1894 (F. H. Snow). Albuquerque, June 27 (H. F. Wickham).

TEXAS: Loma, July 7, 1908 (——). Chisos Mountains, Brewster County, June 10–12, 1908 (Mitchell and Cushman). Devil's River, May 3, 1907 (F. C. Pratt).

UTAH: Zion Canyon, North Fork Virgin River, 4,450 feet, July 26–28, 1921 (W. Knaus). Chad's Ranch, July 22 (H. F. Wickham).

WYOMING: Sheridan, July 6, 1896 (R. P. Currie).

Variations.—This species shows considerable variation. The color is usually bronzy cupreous, but occasionally a specimen is found of an olivaceous green color. The pubescence on the head and abdomen varies in length and density, in color from yellowish white to silvery white, and in well-preserved specimens these pubescent areas are densely covered with a white efflorescence, which is easily lost by abrasion. The front of the head is more deeply depressed in some specimens than in others, and in some examples the prehumeral carinae are quite distinct, whereas in others they are only feebly indicated. The gibbosity on the pronotum is also more prominent in some examples than in others. Length 4.75 to 7.5 millimeters.

Host.—The larval habits are unknown, but the adults have been collected by W. Knaus in Utah on the foliage of scrub oak (*Quercus* sp.).

This species can be easily separated from all previously described species of this genus having the antennae serrate from the fifth joint by the pronotum being distinctly gibbose. Professor Wickham sent me the type of his *mercurius* for study, and suggested that it was probably the same as *gibbicollis* described by Fall, but which was unknown to him at the time he described his species. I have carefully compared his type of *mercurius* with the type of *gibbicollis* and can not find any specific differences, and, since *gibbicollis* has priority, *mercurius* becomes a synonym of that species. The type of *mercurius* is of an olivaceous green color, and has the white efflorescence well preserved, which causes the pubescent vittae to stand out quite prominently.

78. AGRILUS PUBIFRONS, new species

Female.—Form robust, subcylindrical, feebly shining; head and pronotum cupreous brown; elytra bronzy brown, and each elytron ornamented with a pubescent vitta extending from basal depression to apex; beneath cupreous, and more shining than above.

Head with the front rather wide, feebly convex, slightly wider at top than at bottom, the lateral margins feebly, obliquely expanded from bottom to top, and with a narrow, obsolete groove extending from occiput to middle of front; surface rather densely, finely punctate, coarsely, irregularly rugose, and rather densely clothed with long, recumbent, whitish pubescence; epistoma slightly transverse between the antennae, and broadly, rather deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes not very large, and about equally rounded above and beneath.

Pronotum nearly one-third wider than long, slightly narrower at base than apex, and widest near the middle; sides arcuately rounded from apical angles to behind the middle, then more strongly narrowed to near the base, where they are parallel, with the posterior angles feebly projecting outward; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina feebly sinuate, the two carinae broadly separated at apical third, and connected to each other at the base and apex; anterior margin feebly arcuately rounded, without a distinct median lobe; base feebly emarginate at middle of each elytron, and the median lobe feebly, broadly rounded; disk moderately convex, with a shallow, oblong, median depression anteriorly, a broad, shallow, oblique depression on each side along lateral margin at middle, and with distinct, long prehumeral carinae, extending from base to middle, and nearly parallel with the marginal carina; surface densely, finely granulose, with vague, irregular, crenulate rugae, sparsely, finely punctate between the rugae, and sparsely clothed with long, recumbent, whitish hairs in the lateral depressions and along the inner side of prehumeral carinae. Scutellum not transversely carinate, and the surface finely, densely reticulate.

Elytra about as wide as pronotum at base, and about equal in width at base and apical third; sides feebly sinuate or nearly parallel for a short distance behind the base, feebly, broadly constricted in front of middle, broadly, arcuately expanded at apical third, then obliquely narrowed to the tips, which are separately, rather narrowly rounded, and finely serrulate; abdomen broadly exposed above; disk feebly, longitudinally depressed along pubescent vittae, sutural margins strongly elevated posteriorly, and the basal depressions broad and very shallow; surface densely, coarsely imbricate-punctate, and the vittae composed of sparsely placed, moderately long, recumbent, whitish hairs.

Abdomen beneath finely, sparsely punctate, slightly rugose on basal segment, and rather densely clothed with moderately long, recumbent, whitish pubescence, the hairs having a tendency of forming more or less distinct spots at the sides of the segments; first segment convex at middle, without a median groove; last segment broadly rounded at apex; vertical portions of segments rather densely pubescent; pygidium without a projecting carina. Prosternum finely, densely granulose, sparsely, finely punctate, and rather densely clothed with long, recumbent, whitish pubescence; prosternal lobe broad, feebly declivous, and broadly, very feebly emarginate in front; prosternal process broad, slightly expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, straight, and without a distinct tooth on inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth shorter than outer one, and not turned inward.

Length, 6.5 mm.; width, 1.75 mm.

Male.—Unknown.

Type locality.—Pocatello, Idaho.

Other locality.—Chad's Ranch, Utah.

Type.—Cat. No. 41004, U. S. N. M. *Paratype* in the collection of H. F. Wickham.

Described from two females, the type collected by L. Bruner, and the paratype, July 22, by H. F. Wickham.

79. AGRILUS OLENTANGYI Champlain and Knull

Figure 59

Agrilus olentangyi CHAMPLAIN and KNULL, Ann. Ent. Soc. Amer., vol. 18, 1925, pp. 469–470.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 73.

Male.—Form small, moderately elongate, slightly flattened above, and strongly shining; head bronzy green in front, becoming brownish cupreous on the occiput; pronotum, elytra, and body beneath bronzy brown, with a more or less cupreous tinge.

Head with the front broad, slightly convex, about equal in width at bottom and top, the lateral margins parallel, and with a vague, longitudinal depression extending from occiput to epistoma, the depression becoming broader behind the epistoma; surface sparsely, coarsely, irregularly punctate, somewhat rugose, and clothed with a few long, scattered, white hairs; epistoma slightly transverse between the antennae, and broadly, rather deeply, arcuately emarginate in front; antennae extending beyond middle of pronotum, serrate from the fifth joint, and the outer joints slightly longer than wide; eyes large, rather broadly oval, and slightly more acutely rounded beneath than above.

Pronotum one-fourth wider than long, about equal in width at base and apex, and widest near middle; sides feebly, arcuately rounded, slightly more narrowed toward base; when viewed from the side the marginal and submarginal carinae are nearly straight, widely separated anteriorly, and connected to each other behind the middle; anterior margin slightly sinuate, and the median lobe broadly, feebly rounded: base nearly transversely truncate, feebly emarginate at middle of each elytron; disk moderately convex, with two broad, shallow median depressions, a broad, oblique, moderately deep depression on each side along lateral margin, and with sharply defined, straight prehumeral carinae, extending from posterior angles to middle of pronotum; surface finely but not densely rugose, the rugae more or less transverse at middle, sparsely, finely punctate between the rugae, and sparsely clothed with short, inconspicuous, white pubescence, the pubescence becoming longer and more distinct at sides. Scutellum strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra slightly wider than pronotum at base, and equal in width at base and behind middle; sides nearly parallel for short distance behind base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately rounded, and feebly serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, sutural margins strongly elevated from basal third to apex, and with broad, moderately deep basal depressions; surface finely, densely imbricate-punctate, and sparsely, uniformly clothed with short, recumbent, white pubescence, except in humeral region, the pubescence slightly longer on each elytron near suture, forming an indistinct vitta from basal depression to apex.

Abdomen beneath finely, sparsely punctate posteriorly, more densely punctate on basal segment, and sparsely clothed with short, recumbent, white pubescence; first and second segments slightly flattened, and the first finely, densely rugose at middle; last segment broadly rounded at apex; vertical portions of segments not conspicuously pubescent; pygidium feebly carinate, but the carina not projecting. Prosternum finely, sparsely punctate, and rather densely clothed with long, fine, erect hairs, which extend along middle of body to second abdominal segment; prosternal lobe broad, perpendicularly declivous, broadly and rather deeply emarginate in front, forming an obtuse lobe at each side; prosternal process broad, the sides parallel to behind the coxal cavities, then strongly narrowed to the apex, which is acute. Posterior coxae with the posterior margin nearly transversely truncate or feebly sinuate, and the exterior angle rectangular, and not prolonged. Tibiae slender, straight, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi subequal in length to the tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, much shorter than outer one, and not turned inward.

Length, 4.5 mm.; width, 1.125 mm.

Female.—Differs from the male in having the front of head uniformly reddish brown, not so deeply depressed behind the epistoma, eyes more strongly convex laterally, and about equally rounded beneath and above; pronotum with the sides nearly parallel from apical angles to basal fourth, then obliquely narrowed to the posterior angles, base more transversely truncate, and the anterior median depression not so deep; prosternum and median part of body without long, erect pubescence; first and second abdominal segments more convex at middle, and the tibiae unarmed at apex.

Redescribed from the male type in the collection of C. A. Frost.

Type locality.—Texas, no definite locality.

DISTRIBUTION

Material examined:

ILLINOIS: Carbondale, May 8, 1925 (T. Frison).
LOUISIANA: Shreveport, April 7, 1909; Tallulah, April 9, 1909 (W. D. Pierce).
OHIO: Columbus, July 4, 1924 (J. N. Knull).
SOUTH CAROLINA: Clemson College, May 1–26, 1926 (J. O. Pepper).
TEXAS: No definite locality (Belfrage Collection). Cypress Mills, April 2 (——).

Variations.—This species is rather uniform in size and coloration, but the depressions on the pronotum and pubescence on elytra are more or less variable. In some examples the front of the head is rather distinctly longitudinally depressed, whereas in others the front is convex with scarcely any indications of a depression.

Host.—The larval habits are unknown, but the adults have been collected by J. O. Pepper in South Carolina on the foliage of oak (*Quercus* sp.).

This species was described from a unique male from Texas, and five females collected by J. N. Knull on vegetation along the Olentangy River, at Columbus, Ohio. It is allied to *lacustris* LeConte and can be easily separated from that species by the broadly, deeply emarginate prosternal lobe, but great care must be taken in using the pubescent vittae on the elytra for separating it from allied species.

The pubescent vittae are at the best very obsolete, and will be somewhat misleading to some students. In most of the specimens examined the surface of the elytra is rather uniformly pubescent, especially posteriorly. The hairs are distinctly separated, and it seems that the only indications of vittae are along the basal half, which is due to the absence of distinct hairs in the humeral region and for a short distance behind the humeri.

80. AGRILUS MIMOSAE, new species

Female.—Form moderately elongate, slightly flattened above, and feebly shining; above piceous, with a vague cupreous or aeneous tinge, the head more reddish cupreous in front, and each elytron with a pubescent vitta extending from basal depression to apex; beneath cupreous brown, and more shining than above.

Head with the front rather wide, slightly convex, equal in width at top and bottom, the lateral margins nearly parallel to each other, and with a vague, longitudinal groove extending from the occiput to the epistoma; surface obsoletely granulose, finely, irregularly rugose, sparsely punctate between the rugae, and sparsely clothed with very short, recumbent, white hairs; epistoma not transverse between the antennae, and broadly, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints slightly wider than long; eyes rather large, broadly oblong, and slightly more acutely rounded beneath than above.

Pronotum about one-fourth wider than long, nearly equal in width at base and apex, and widest at middle; sides regularly, arcuately rounded from apical angles to near posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are more or less sinuate, and narrowly separated for their entire length; anterior margin strongly sinuate, and the median lobe strongly produced; base feebly emarginate at middle of each elytron, the median lobe broadly rounded, and vaguely emarginate in front of scutellum; disk moderately convex, with a vague, longitudinal median depression, a rather deep depression on each side along lateral margin, and with vaguely indicated prehumeral carinae; surface finely, transversely rugose, the rugae somewhat concentrical on the disk, sparsely, finely punctate between the rugae, and sparsely clothed with white hairs in the lateral depressions. Scutellum distinctly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and equal in width at base and behind the middle; sides nearly parallel for a short distance behind base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and finely serrulate; sides of abdomen broadly exposed above; disk feebly flattened, narrowly depressed along the sutural margins, which are strongly elevated posteriorly, and with broad, shallow basal depressions; surface coarsely, densely imbricate-punctate, sparsely, uniformly clothed with short indistinct hairs, and each elytron ornamented with a narrow vitta of sparsely placed white hairs, extending from the basal depression to apex.

Abdomen beneath obsoletely granulose, finely, sparsely punctate, the punctures connected transversely by sinuate lines, which are coarser on basal segment, and sparsely, uniformly clothed with short, recumbent, white hairs; first segment convex at middle; vertical portions of the segments sparsely clothed with moderately long, white hairs; pygidium finely, sparsely punctate, and not longitudinally carinate. Prosternum finely, sparsely punctate, and sparsely clothed with short, white hairs; prosternal lobe broad, strongly declivous, and broadly subtruncate in front; prosternal process rather narrow, slightly expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, and unarmed at the apex. Posterior tarsi distinctly shorter than the tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than the outer one. and not turned inward.

Length, 4.5 mm.; width, 1 mm.

Male.—Unknown.

Type locality.—Devil's River, Tex.

Type.—Cat. No. 41007, U.S.N.M.

Described from a single female, collected at the type locality, May 2, 1907, on *Mimosa borealis* Gray by E. A. Schwarz.

81. AGRILUS CHIRICAHUAE, new species

Figure 60

Male.—Form small, moderately elongate, slightly flattened above, and feebly shining; head varying from bluish green to bronzy green, becoming piceous on the occiput; pronotum and elytra piceous, sometimes with a feeble cupreous tinge, and each elytron ornamented with a more or less distinct pubescent vitta extending from basal depression to apex; beneath piceous, with a bronzy tinge, and more shining than above.

Head with the front rather wide, feebly convex, about equal in width at top and bottom, the lateral margins vaguely, arcuately constricted below the middle, and with a feeble, narrow, longitudinal groove extending from the occiput to the epistoma; surface densely, finely granulose, rather densely, finely punctate, becoming longitudinally rugose on the occiput, and sparsely, uniformly clothed with moderately long, recumbent, silvery white hairs; epistoma not transverse between the antennae, and broadly, not deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes large, and equally rounded above and beneath.

Pronotum about one-fourth wider than long, slightly narrower at base than apex, and widest near the middle; sides feebly, arcuately rounded from apical angles to behind the middle, then more strongly narrowed to near the base, where they are parallel, with the posterior angles rectangular or feebly produced outward; when viewed from the side the marginal carina is feebly sinuate, the submarginal carina nearly straight, the two carinae rather widely separated anteriorly, and connected to each other behind the middle; anterior margin feebly sinuate, and the median lobe not prominent: base feebly emarginate at middle of each elytron, and the median lobe feebly, broadly rounded; disk moderately convex, with a more or less distinct narrow median depression extending from base to near anterior margin, a vague depression on each side along lateral margin, and with distinct, arcuate prehumeral carinae, extending from the posterior angles to near the middle; surface rather finely, transversely rugose, the rugae more or less longitudinal at the sides, sparsely, finely punctate between the rugae, and with a few inconspicuous hairs at the sides. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and apical third; sides nearly parallel for a short distance behind the base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and finely serrulate; abdomen broadly exposed above; disk feebly flattened, sutural margins strongly elevated posteriorly, and with broad, moderately deep, basal depressions; surface coarsely, densely imbricate-punctate, and each elytron ornamented with a narrow vitta of sparsely placed, short, recumbent, white hairs, extending from the basal depression to apex.

Abdomen beneath finely, sparsely punctate posteriorly, the punctures denser and connected transversely by sinuate lines on basal segments, and sparsely clothed with short, inconspicuous hairs; first segment feebly, broadly longitudinally grooved at middle; last segment broadly rounded or subtruncate at apex; vertical portions of segments sparsely clothed with moderately long, white hairs; pygidium finely, sparsely punctate, and not longitudinally carinate. Prosternum finely, sparsely punctate, and sparsely clothed with long, semierect, whitish hairs; prosternal lobe broad, strongly declivous, and broadly rounded or subtruncate in front; prosternal process broad, slightly expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than the outer one, and not turned inward.

Female.—Differs from the male in having the lateral margins of head parallel, surface not distinctly granulose, more sparsely punctured, more or less irregularly rugose, the pubescence sparser and shorter, and the color varying from brownish cupreous to bronzy cupreous; first abdominal segment convex, and not sulcate at middle; prosternum smoother, the pubescence sparser and more recumbent, and the tibiae unarmed at apex.

Length, 3.1–4.25 mm.; width, 0.87–1.12 mm.

Type locality.—Williams, Ariz.

Other localities.—Arizona: Prescott, Santa Rita Mountains, Oracle, Huachuca Mountains, Chiricahua Mountains, and the Pinal Mountains.

Type, allotype, and paratypes.—Cat. No. 41003, U.S.N.M. *Paratypes* in collections of J. N. Knull and H. F. Wickham.

Described from 10 examples (1 type). The type, allotype, and one paratype collected at the type locality, June 15–July 1, by Barber and Schwarz; one paratype collected at Prescott, June 16, by Barber and Schwarz; one paratype collected in the Santa Rita Mountains on oak, June 24, one at Oracle on oak, July 6, and one in the Chiricahua Mountains, July 1, by Hubbard and Schwarz; one paratype collected in the Huachuca Mountains, July 11, by H. A. Wenzel; and two paratypes collected in the Pinal Mountains by H. F. Wickham.

82. AGRILUS AENEOCEPHALUS, new species

Figure 61

Male.—Form rather slender, slightly flattened above, and moderately shining; head bronzy green; pronotum and elytra cupreous brown, and each elytron ornamented with a vague pubescent vitta; beneath bronzy green, and more shining than above.

Head with the front rather wide, nearly flat, about equal in width at top and bottom, the lateral margins sinuate and vaguely constricted at middle, and with a broad, shallow depression, extending from the occiput to epistoma; surface densely granulose, coarsely punctate, more or less rugose, and sparsely clothed with short, recumbent, white hairs; epistoma rather narrow between the antennae, broadly, deeply, arcuately emarginate in front, and the clypeal suture distinct; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints as wide as long; eyes rather small, broadly oval, and about equally rounded above and beneath.

Pronotum about one-fourth wider than long, about equal in width at base and apex, and widest at middle; sides regularly, arcuately rounded from apical angles to near the posterior angles, which are rectangular; when viewed from the side the marginal carina is slightly sinuate, the submarginal carina nearly straight, the two carinae rather narrowly separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate, and the median lobe broadly rounded; base feebly emarginate at middle of each elytron, with the median lobe feebly produced, and subtruncate in front of scutellum; disk moderately convex, with broad, more or less distinct median depressions, arranged longitudinally, a broad, shallow depression on each side along the lateral margin, and with sharply defined prehumeral carinae; surface finely, transversely rugose, finely, sparsely punctate, and sparsely clothed with short, recumbent, white hairs. Scutellum vaguely, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and equal in width at base and apical third; sides nearly parallel for a short distance behind base, broadly, feebly constricted in front of middle, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and strongly serrulate; sides of abdomen broadly exposed above; disk feebly flattened, sutural margins rather strongly elevated behind the middle, and with broad, shallow, basal depressions; surface finely, densely imbricate-punctate, sparsely clothed with indistinct hairs, and each elytron ornamented with a vague vitta of short white hairs, extending from the basal depression to apex.

Abdomen beneath finely, sparsely punctate, the punctures more or less connected transversely by sinuate lines, which are coarser on the basal segment, and rather densely, uniformly clothed with moderately long, recumbent, white hairs; first segment feebly, longitudinally concave, and clothed with longer and more erect hairs at the middle; vertical portions of the segments rather densely clothed with long, recumbent, white hairs; pygidium feebly, longitudinally carinate, but the carina not projecting. Prosternum coarsely, sparsely punctate, more or less rugose, and moderately clothed with long, erect, white hairs; prosternal lobe broad, strongly declivous, and broadly subtruncate in front; prosternal process broad, expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, straight, and the anterior and middle pairs armed with a small tooth on the inner margin at apex. Posterior tarsi about as long as the tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth shorter than outer one, and not turned inward.

Length, 5.75 mm.; width, 1.5 mm.

Female.—Differs from the male in being more robust, front of head slightly broader, sides of abdomen more broadly exposed above; prosternum without long, erect hairs; first abdominal segment convex at middle, and the tibiae without a distinct tooth at apex.

Length, 8 mm.; width, 2.1 mm.

Type locality.—Huachuca Mountains, Ariz.

Other localities.—Baboquivaria Mountains, Ariz.

Type.—Cat. No. 41008, U.S.N.M. *Allotype*, collection of J. N. Knull; *paratype*, collection of H. C. Fall.

Described from three examples—one male and two females. The type collected at the type locality by M. Chrisman, the allotype collected at the same locality, July 28, 1907, by J. S. Hine, and the female paratype collected in the Baboquivaria Mountains, Ariz., by F. H. Snow.

83. AGRILUS MALVASTRI, new species

Figure 62

Male.—Form robust, slightly flattened above, moderately shining, uniformly green, with a distinct aureus or aeneous tinge, and each elytron ornamented with a vague pubescent vitta.

Head with the front rather narrow, nearly flat, slightly wider at top than bottom, the lateral margins arcuately expanded above the middle, and with a shallow groove extending from the occiput to epistoma; surface rather coarsely, irregular rugose, finely, sparsely punctate, and sparsely clothed with semierect yellowish white hairs; epistoma narrow between the antennae, and broadly, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes large, broadly oval, and about equally rounded above and beneath.

Pronotum wider than long, narrower at base than apex, and widest along apical half; sides nearly parallel or vaguely rounded from apical angles to near base, where they are strongly sinuate, with the posterior angles rectangular; when viewed from the side the marginal and submarginal carinae are strongly sinuate, widely separated anteriorly, and connected to each other behind the middle; anterior margin moderately sinuate, with the median lobe broadly rounded; base feebly, arcuately emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk strongly convex, with a vague median depression anteriorly, a broad, oblique depression on each side along the lateral margin, extending from apical fourth to base, and with rather distinct, obtuse prehumeral carinae; surface coarsely, densely scabrous, sparsely, finely punctate, and sparsely clothed with long, recumbent, whitish pubescence in the lateral depressions. Scutellum not distinctly carinate, but the surface more or less rugose, and finely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and apical third; sides nearly parallel for a short distance behind base, broadly, vaguely constricted in front of middle, broadly arcuately rounded behind the middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and feebly serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, feebly, broadly depressed along the sutural margins, which are slightly elevated posteriorly, and with broad, shallow basal depressions, surface coarsely, densely imbricate-punctate, sparsely, uniformly clothed with short, recumbent, whitish hairs, and each elytron ornamented with a feebly indicated vitta of similarly colored hairs, extending from basal depression to apex.

Abdomen beneath sparsely, finely punctate, the punctures connected transversely by sinuate lines, which are coarser on the basal segment, and sparsely clothed with short, recumbent, whitish hairs, the hairs denser and slightly longer at the sides of the last three segments; first segment slightly longitudinally flattened, and clothed with slightly longer, semierect hairs at the middle; vertical portions of the segments rather densely clothed with long, recumbent, whitish hairs; pygidium sparsely punctate, and feebly, longitudinally carinate, but the carina not projecting. Prosternum finely, densely punctate, and rather densly clothed with long, erect, whitish hairs; prosternal lobe rather narrow, strongly declivous, and subtrunctate in front; prosternal process rather broad, slightly expanded behind the coxal cavities then abruptly narrowed to the apex, which is acute. Tibiae slender, nearly straight, and the anterior and middle pairs armed with a small tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth shorter than outer one, and not turned inward.

Female.—Differs from the male in having the front of head broader and the lateral margins more parallel to each other; abdomen more broadly exposed above; first abdominal segment convex, and not clothed with longer hairs at middle; pubescence on prosternum more recumbent, and the tibiae without a tooth at apex.

Length, 6.75 mm.; width, 1.75 mm.

Type locality.—Meade County, Kans.

DISTRIBUTION

Material examined:

ARIZONA: Hereford, July 28, 1907 (J. S. Hine).

CANADA (Alberta): Medicine Hat, June 18–July 15, on *Malvastrum coccineum* (Pursh) Gray (F. C. Carr).

COLORADO: Trinidad, June 25 (H. F. Wickham).

KANSAS: Meade and Seward Counties, May 16; "West. Kan." (E. A. Popenoe). Douglas, Hamilton, and Clarke Counties (F. H. Snow). "Kan. Snow" (Knull collection).

MONTANA: Poplar, July 13, 1922 (C. C. Sperry). "Mon." (Knull collection).

NEW MEXICO: Mesilla, August 28; Santa Fe, June (T. D. A. Cockerell). Lake Burford, June 17, 1918 (A. Wetmore).

TEXAS: Alpine, July 20–22, 4,400–6,000 feet (H. F. Wickham).

WYOMING: Medicine Bow, June 23, 6,562 feet (H. F. Wickham).

Type, allotype, and paratypes.—Cat. No. 41005, U.S.N.M. *Paratypes* in following collections: H. F. Wickham, C. A. Frost, W. Knaus, F. C. Carr, J. N. Knull, Museum of Comparative Zoölogy, University of Kansas, and the Canadian National Collection at Ottawa.

Described from 69 specimens (1 type), all collected at the localities mentioned above. This large series of paratypes show considerable variations, the color varying from bronzy green to cupreous brown, and the pubescence from white to yellowish white. The depressions on front of head and middle of pronotum vary considerably in distinctness. In some of the examples examined the pronotum is widest along the anterior half and the sides are nearly parallel from the apical angles to near the base, whereas in others it is widest at apical third, and the sides are strongly, arcuately rounded. Length 4.5 to 7 millimeters. F. C. Carr collected a large series of this species on *Malvastrum coccineum* (Pursh) Gray, which may be the host plant for the larvae.

84. AGRILUS FALLI, new species

Figure 63

Male.—Form rather slender, subcylindrical, and moderately shining; above olivaceous green, with a rather distinct cupreous tinge, and each elytron ornamented with a pubescent vitta; beneath bronzy green, with a slight cupreous reflection and more shining than above.

Head with the front rather wide, feebly convex, slightly wider at bottom than at top, the lateral margins vaguely expanded from top to bottom, and with a rather broad, shallow groove extending from the occiput to near the epistoma; surface densely granulose, more or less coarsely rugose, and rather densely clothed with long, recumbent, silvery white hairs; epistoma not transverse between the antennae, and vaguely, broadly, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints nearly as wide as long; eyes large, broadly oval, and about equally rounded above and beneath.

Pronotum about as long as wide, slightly narrower at base than apex, and widest along apical half; sides nearly parallel to behind middle, then obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are strongly sinuate, widely separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, with the median lobe broadly rounded, and rather strongly produced; base slightly emarginate at middle of each elytron, and the median lobe broadly rounded, and subtruncate in front of scutellum; disk strongly convex, without median depressions, but with a broad, oblique depression on each side along the lateral margin, and with vaguely indicated prehumeral carinae; surface coarsely, deeply rugose, or scabrous, finely, sparsely punctate between the rugae, and sparsely clothed at the sides with long, recumbent white hairs. Scutellum not transversely carinate, but the surface more or less rugose, and finely reticulate.

Elytra about as wide as pronotum at base, and equal in width at base and apical third; sides nearly parallel from base to apical third (broadly, vaguely constricted at middle), then obliquely narrowed to the tips, which are separately, rather narrowly rounded, and coarsely serrulate; sides of abdomen broadly exposed above; disk longitundinally depressed along the pubescent vittae, sutural margins slightly elevated posteriorly, and with broad, shallow basal depressions; surface densely, coarsely imbricate-punctate, sparsely, uniformly clothed with short, recumbent, white hairs, and each elytron ornamented with a vitta of sparsely placed white hairs extending from the basal depression to apex.

Abdomen beneath finely, sparsely punctate, more or less rugose on the basal segment, and rather densely clothed with recumbent, white hairs, which have a tendency toward forming spots at the sides of the third and fourth segments; first segment slightly flattened, and clothed with slightly longer and denser hairs at the middle; vertical portions of the segments rather densely pubescent; pygidium finely punctate, but not distinctly carinate posteriorly. Prosternum finely, densely rugose, and densely clothed with long, erect, white hairs; prosternal lobe rather narrow, strongly declivous, and broadly truncate in front; prosternal process broad, slightly expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, nearly straight, and the anterior pair armed with a small tooth on inner margin at apex (middle legs missing). Posterior tarsi nearly as long as the tibiae, and the first joint as long as the following two joints united. Tarsal claws on posterior feet cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward (claws on anterior and middle feet missing).

Female.—Differs from the male in having the prosternum sparsely clothed with recumbent, white hairs, the first abdominal segment convex, and not clothed with longer hairs at the middle, and the tibiae without a distinct tooth on inner margin at apex.

Length, 5.75 mm.; width, 1.3 mm.

Type locality.—Nogales, St. Cruz County, Ariz.

Other localities.—Downing's Ranch, Terrell County, Tex.

Type and allotype.—In the collection of H. C. Fall. *Paratype*, Cat. No. 41006, U.S.N.M.

Described from three examples (one type). The type and allotype were collected at the type locality August 12, 1906, by H. C. Fall, and the female paratype on the Downing's Ranch, Terrell County, Tex., May 10, 1912, by J. D. Mitchell. The paratype is smaller than the types, measuring only 4.5 millimeters in length, but otherwise they are nearly identical.

85. AGRILUS ILLECTUS Fall

Figure 64

Agrilus illectus Fall, Calif. Acad. Sci., Occasional Papers, No. 8, 1901, p. 242; Ent. News, vol. 18, 1907, pp. 176–177.—Woodworth, Guide to California Insects, 1913, p. 195.—Chamberlin, Cat. Buprestidae, 1926, p. 65; *jacobinus* p. 67 (part).

Male.—Form moderately robust, subcylindrical, slightly flattened above, and feebly shining; head, pronotum, and elytra brownish cupreous, with the sides of pronotum and vitta on each elytron sparsely clothed with short, recumbent, whitish hairs; beneath cupreous, and more shining than above.

Head with the front rather wide, slightly convex, about equal in width at top and bottom, the lateral margins feebly expanded near the middle, and with a moderately deep, broad depression extending from occiput to epistoma; surface finely, densely granulose, sparsely punctate, coarsely rugose, especially on the occiput where the rugae are longitudinal, and the surface nearly concealed by long, recumbent, whitish pubescence; epistoma slightly transverse between the antennae, slightly elevated, and broadly, deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes large, broadly oblong, and about equally rounded above and beneath.

Pronotum slightly wider than long, feebly narrower at base than apex, and widest along apical half; sides nearly parallel or vaguely narrowed from near apical angles to behind middle, then more strongly, obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina feebly sinuate, the two carinae rather widely separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, and the median lobe strongly rounded; base feebly emarginate at middle of each elytron, the median lobe strongly, broadly rounded, and feebly emarginate in front of scutellum; disk moderately convex, with a broad, shallow, transverse median depression at apical third, a broad, deep, oblique depression on each side along lateral margin, and with moderately distinct, sinuate prehumeral carinae; surface finely, densely granulose, strongly, closely, transversely rugose at the middle, sparsely, finely punctate between the rugae, and rather densely clothed with long, recumbent, whitish hairs toward the sides. Scutellum feebly, transversely carinate, and the surface densely, finely reticulate.

Elytra about as wide as pronotum at base, and slightly wider at base than behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted near middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded and feebly serrulate; sides of abdomen broadly exposed above; disk feebly flattened, sutural margins elevated from basal third to apex, and with broad, shallow basal depressions; surface coarsely, densely imbricate-punctate, sparsely clothed posteriorly with short, inconspicuous, white hairs, and each elytron ornamented with a vitta of sparsely placed, short, recumbent, whitish hairs extending along suture from basal depression to apex.

Abdomen beneath finely, sparsely punctate, the punctures connected transversely by fine, sinuate lines, and moderately clothed with recumbent, whitish pubescence; first and second segments slightly flattened at middle; last segment broadly rounded at apex; vertical portions of the segments rather densely clothed with long, recumbent, whitish pubescence; pygidium sparsely punctate, feebly carinate, but the carina not projecting. Prosternum finely, densely punctate, and densely clothed with long, erect, whitish hairs, which extend along middle of body to second abdominal segment; prosternal lobe broad, strongly declivous, and broadly truncate in front; prosternal process broad, the sides slightly expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Length, 5.5 mm.; width, 1.4 mm.

Female.—Differs from the male in having the front of head slightly wider, the lateral margins feebly expanded from bottom to top, and the pubescence shorter and sparser; first and second abdominal segments convex, and without longer pubescence at middle; pubescence on prosternum shorter and recumbent, and the tibiae unarmed at apex.

Redescribed from the male type in the collection of H. C. Fall.

Type locality.—Pomona, Calif..

DISTRIBUTION

Arizona: Flagstaff, July 5 (Barber and Schwarz).

California: Pomona, June 25, 1895 (male type); Pasadena, June (H. C. Fall). Poway (——). Los Angeles County, May (D. W. Coquillett). Arroya Seco Canyon, San Gabriel Mountains, Los Angeles County, July 26, 1912 (——). Bridgeport, 6,465 feet, July 12–15 (H. F. Wickham).

Variations.—The color above varies from reddish cupreous to bronzy brown; beneath from bronzy green to cupreous, and the pubescence is more yellowish in some specimens than in others. In some examples the pronotum is widest at the middle, the sides are arcuately rounded, and the marginal and submarginal carinae are separated for their entire length. The median depression on the pronotum is more or less variable, and the scutellum is usually strongly, transversely carinate, but in a few examples the carina is only feebly indicated as in the type. Length 5.5 to 7.5 millimeters.

Host.—Unknown.

This species is very closely allied to *jacobinus* Horn, which is out of place in Horn's table, it being assigned to the section having the antennae serrate from the fourth joint, whereas the serration begins at the fifth joint. This error was discovered by Fall (1907), and thinking that it was the same species as his *illectus*, placed his species as a synonym of *jacobinus*. There will be some difficulty in separating these two species, but *illectus* is a valid species and has the pronotum more or less depressed at the middle and the surface is usually transversely rugose, the scutellum is feebly, transversely carinate, the pubescent vittae on the elytra are rather distinct, and the posterior margin of the hind coxae is strongly sinuate, whereas in *jacobinus* the pronotum is convex, without any median depressions, and the surface is usually densely scabrous, the scutellum is not transversely carinate, the pubescent vittae on the elytra are obsolete, and the posterior margin of the hind coxae is regularly, arcuately emarginate. The males of the two species can be readily separated by the genitalia.

86. AGRILUS SIERRAE Van Dyke

Agrilus sierrae VAN DYKE, Bull. Brooklyn Ent. Soc., vol. 18, 1923, pp. 40–41.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 81.

Male.—Form similar to *abditus* Horn, but slightly larger and feebly shining; head bronzy green in front, but becoming more brownish on the occiput; pronotum and elytra uniformly bronzy brown; beneath slightly more bronzy green and more shining than above.

Head with the front rather wide, slightly convex, and about equal in width at top and bottom, the lateral margins nearly parallel to each other, and with a broad, moderately deep depression extending from the occiput to epistoma, the depression more broadly, deeply impressed on the vertex; surface densely granulose, more or less irregularly rugose, and rather densely clothed with moderately long, semierect whitish pubescence; epistoma not transverse between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints as wide as long; eyes large, broadly oblong, and slightly more broadly rounded above than beneath.

Pronotum slightly wider than long, about equal in width at base and apex, and widest near middle; sides feebly arcuately rounded from apical angles to behind middle, then more strongly narrowed to near the base, where they are slightly sinuate, and the posterior angles rectangular; when viewed from the side the marginal carina is strongly sinuate and deflexed anteriorly, the submarginal carina feebly sinuate, and the two carinae rather widely separated for their entire length, but more strongly anteriorly; anterior margin rather strongly sinuate, with the median lobe strongly, broadly rounded; base feebly, broadly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, with a vague, broad median depression anteriorly, a broad, shallow depression on each side along the lateral margin, and with distinct, but not sharply defined prehumeral carinae; surface coarsely, transversely rugose, sparsely, finely punctate between the rugae, and sparsely clothed with short, inconspicuous hairs, especially at the sides. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra about as wide as pronotum at base, and equal in width at base and behind middle, feebly, broadly constricted near middle, and obliquely narrowed posteriorly to the tips, which are separately, rather narrowly rounded, and finely serrulate; sides of abdomen rather broadly exposed above; disk slightly flattened along the sutural margins, which are slightly elevated posteriorly, and with broad, shallow basal depressions; surface rather densely, coarsely imbricate-punctate, and each elytron with a very indistinct longitudinal vitta of sparsely placed, short, white hairs.

Abdomen beneath finely, sparsely punctate, the punctures becoming coarser, and more or less transversely connected by sinuate lines on the basal segment, and sparsely clothed with short, recumbent, whitish hairs; first segment feebly flattened at the middle; last segment broadly rounded at apex; vertical portions of the segments not conspicuously pubescent; pygidium sparsely punctate, but not distinctly longitudinally carinate. Prosternum finely, densely punctate, and densely clothed with long, erect, whitish hairs, which extend along middle of body to the abdomen; prosternal lobe broad, strongly declivous, and broadly rounded or vaguely sinuate in front; prosternal process broad, the sides rather strongly expanded behind the coxal cavities, and the apex with a distinct tooth at middle. Posterior coxae with the posterior margin strongly sinuate, and the exterior angle distinctly prolonged. Tibiae slender, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi shorter than tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, much shorter than outer one, and not turned inward. Genitalia not examined.

Length, 5.75 mm.; width, 1.5 mm.

Female.—Not seen, but according to the original description differs from the male in having a crescentic, transverse depression in addition to the longitudinal depression on front of head, pubescence on prosternum shorter and more recumbent, and the first abdominal segment convex at middle.

Redescribed from the male paratype in the collection of Dr. Edwin C. Van Dyke, in the California Academy of Sciences at San Francisco.

Type locality.—Mariposa County, Calif. (Type in California, Academy of Sciences. Not seen.)

Distribution.—Mariposa County (type locality), June 12, 1914 (F. W. Nunenmacher).

Host.—Unknown.

From the single male examined this species seems to be closely allied to *abditus* Horn, described from western Nevada. It differs, however, from that species in having the front of the head broadly and rather deeply depressed, the marginal and submarginal carinae separated from each other for their entire length, and with a feebly indicated pubescent vitta on each elytron. It is just possible that specimens will be found with the pubescent vittae more distinct, in which case it might be confused with *illectus* Fall, but it can be separated from that species by having the sides of the pronotum only feebly depressed, and these depressions without long pubescence.

87. AGRILUS FELIX Horn

Figure 65

Agrilus felix HORN, Trans Amer. Ent. Soc., vol. 18, 1891, pp. 326–327; Proc. Calif. Acad. Sci., vol. 4, ser. 2, 1894, p. 328.—GRIFFITH, Ent. News, vol. 11, 1900, p. 568.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67.—SCHAEFFER, Brooklyn Inst. Mus., Sci. Bull., vol. 1, no. 6, 1905, p. 131.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 223.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 62.

Female.—Form moderately robust, subcylindrical, feebly flattened above, and moderately shining; head brownish cupreous; pronotum and elytra brownish cupreous, with the sides of pronotum and a vitta on each elytron clothed with whitish pubescence; beneath aeneous, with a more or less distinct cupreous tinge.

Head with the front moderately wide, feebly convex, and slightly wider at top than at bottom, the lateral margins feebly, arcuately expanded above middle, and with a broad, moderately deep, longitudinal groove extending from occiput to epistoma; surface coarsely, densely punctate, coarsely, irregularly rugose, and densely clothed with long, recumbent, whittish pubescence, which nearly conceals the surface; epistoma scarcely transverse between the antennae, feebly elevated, and broadly but not very deeply, arcuately emarginate in front; antennae extending slightly beyond anterior margin of pronotum, serrate from the fifth joint, and the outer joints as wide as long; eyes broadly oblong, and slightly more acutely rounded beneath than above.

Pronotum about as long as wide, slightly narrower at base than apex, and widest near apical angles; sides feebly, obliquely narrowed from near the apical angles to near the posterior angles, where they are feebly sinuate, and the posterior angles rectangular; when viewed from the side the marginal and submarginal carinae are strongly sinuate, rather widely separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base vaguely emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, without median depressions, but with a vague depression on each side along lateral margin, and with moderately distinct, strongly arcuate prehumeral carinae; surface obsoletely granulose, coarsely, transversely rugose at middle, sparsely, finely punctate between the rugae, and sparsely clothed at the sides with long, recumbent, whitish pubescence. Scutellum feebly, transversely carinate, and the surface finely, densely reticulate.

Elytra about as wide as pronotum at base, and slightly wider at base than behind middle; sides nearly parallel for a short distance behind base, feebly, arcuately constricted near middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and feebly serrulate; sides of abdomen broadly exposed above; disk with a vague longitudinal costa, between which and the suture the surface is longitudinally concave, sutural margins elevated from basal third to apex, and with broad, moderately deep basal depressions; surface densely, coarsely imbricate-punctate, sparsely, uniformly clothed with short, inconspicuous hairs, and each elytron ornamented with a vitta of sparsely placed, whitish hairs, extending along sutural depression from basal depression to apex.

Abdomen beneath rather densely, finely punctate, the punctures connected transversely by fine, sinuate lines, and densely clothed with long, recumbent, whitish pubescence, nearly concealing the surface; first segment convex at middle; last segment broadly rounded at apex; vertical portions of segments densely pubescent similar to ventral surface; pygidium sparsely punctate, feebly carinate, but the carina not projecting. Prosternum finely, densely punctate, and densely clothed with long, recumbent, whitish hairs; prosternal lobe broad, moderately declivous, and broadly subtruncate in front; prosternal process broad, the sides vaguely expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, anterior and middle pairs vaguely arcuate, and without a tooth at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth slightly shorter than outer one, and not turned inward.

Length, 5.5 mm.; width, 1.38 mm.

Male.—Differs from the female in having the front of head slightly more greenish and narrower; antennae extending nearly to middle of pronotum; first abdominal segment vaguely flattened at middle; pubescence on prosternum slightly more erect; anterior and middle tibiae armed with a short tooth on inner margin at apex, the tarsal claws cleft closer to tip, and the teeth nearly equal in length.

Redescribed from the female lectotype No. 3493 in the Philadelphia Academy of Natural Sciences.

Type locality.—Arizona, probably near Tucson.

DISTRIBUTION

Material examined:

ARIZONA: Nogales, Aug. 12, 1906 (F. W. Nunenmacher). Ashfork, June 17–24 (Barber and Schwarz). Catalina Springs, May 5, reared (Hubbard and Schwarz). Baboquivaria Mountains (F. H. Snow).

Also recorded from the following localities, but some of these records may not be this species:

ARIZONA: Prescott; Phoenix; Tucson; Huachuca Mountains.
COLORADO: Glenwood Springs.
LOWER CALIFORNIA: San Julio.
UTAH: St. George.

Variations.—Very little variation was observed in the specimens examined except in color and size, the color varying from reddish cupreous to bronzy green, and the length from 4.5 to 6 millimeters. In some of the specimens the front of the head is more deeply depressed than in others, and the rugae on the pronotum are coarser and more widely separated.

Host.—This species has been reared from "Palo Verde" (*Parkinsonia microphylla* Torrey) in Arizona by Hubbard and Schwarz.

This species is very closely allied to *jacobinus* Horn, but can be separated from that species by having the sides of the pronotum clothed with distinct long hairs, and with a distinct pubescent vitta on each elytron, whereas in *jacobinus* the sides of the pronotum are not clothed with long hairs, and the pubescent vittae on the elytra are obsolete. In *felix* the upper surface is more shining and with scarcely any pubescence, which causes the pubescent vittae to be more prominent, whereas in *jacobinus* the surface is subopaque, and sparsely, uniformly clothed with short whitish hairs, while the hairs in the vittae are slightly more yellowish, and a little more closely placed. Horn (1891) described both sexes, but both specimens in the Horn collection at present are females.

88. AGRILUS JACOBINUS Horn

Figure 66

Agrilus jacobinus Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 314–315.—Fall, Calif. Acad. Sci., Occasional Papers, no. 8, 1901, p. 120.—Woodworth, Guide to California Insects, 1913, p. 195.—Myers, Journ. Ent. and Zool., vol. 10, 1918, p. 48.—Chamberlin, Cat. Buprestidae, 1926, p. 67 (part).

Male.—Form subcylindrical, feebly flattened above, subopaque, dark brown, with a more or less cupreous and plumbeus tinge; beneath slightly more cupreous and shining than above.

Head with the front rather wide, feebly convex, slightly wider at top than at bottom, the lateral margins feebly, arcuately expanded near vertex, and with a narrow, moderately deep depression extending from the occiput to epistoma; surface rugose on the occiput, and the entire surface nearly concealed by long, recumbent, whitish pubescence; epistoma slightly transverse between the antennae, and rather deeply, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fifth joint, and the outer joints slightly wider than long; eyes rather large, and about equally rounded above and beneath.

Pronotum only feebly wider than long, base and apex about equal in width, and widest near middle; sides feebly, arcuately rounded from apical angles to behind middle, then more obliquely narrowed to near the posterior angles, where they are parallel and the posterior angles rectangular; when viewed from the side the marginal and submarginal carinae are strongly sinuate, widely separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate, with the median lobe strongly, broadly rounded; base feebly emarginate at the middle of each elytron, the median lobe broadly rounded and subtruncate in front of scutellum; disk strongly convex, without median depressions, but with broad, shallow, lateral depressions, and sharply defined, strongly arcuate prehumeral carinae, the carinae extending from posterior angle inward along base, then forward to near the middle of pronotum; surface coarsely, densely rugose, the rugae more or less transverse and interrupted, finely punctate between the rugae, and sparsely clothed with short, inconspicuous hairs. Scutellum not distinctly, transversely carinate, but the surface rather uneven and densely granulose.

Elytra about as wide as pronotum at base, and slightly wider at base than behind middle; sides nearly parallel and feebly sinuate for a short distance behind base, broadly, obsoletely constricted near middle, feebly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, rather acutely rounded, and feebly serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, sutural margins strongly elevated posteriorly, causing the surface to be feebly, longitudinally concave from basal third to apex, and with broad, moderately deep basal depressions; surface finely, densely imbricate-punctate, and sparsely, uniformly clothed with short, recumbent hairs, which are whitish toward the sides, becoming yellowish and slightly denser toward the sutural margins, and forming a more or less distinct vitta on each elytron extending from basal depression to apex.

Abdomen beneath obsoletely granulose, rather densely, finely punctate, the punctures connected transversely by sinuate lines, which are more distinct on the basal segments, and densely, uniformly clothed with long, recumbent, whitish pubescence; first and second segments feebly, longitudinally flattened, and with the pubescence slightly longer along the middle; last segment broadly rounded at apex; vertical portions of the segments rather densely clothed with long, recumbent, whitish pubescence; pygidium sparsely, coarsely punctate, feebly carinate, but the carina not projecting. Prosternum densely, coarsely punctate, and densely clothed with long, whitish pubescence, which extends along middle of body to second abdominal segment; prosternal lobe broad, rather strongly declivous, and broadly rounded in front; prosternal process broad, the sides parallel to behind the coxal cavities, and transversely truncate at apex. Tibiae slender, the anterior pair feebly arcuate, and the anterior and middle pairs armed with a short tooth on the inner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the apex, the two teeth nearly equal in length, and the inner tooth at most only feebly turned inward.

Length, 7.5 mm.; width, 1.9 mm.

Female.—Differs from the male in having the front of head slightly broader, and the sides more parallel; first and second abdominal segments convex at middle and the pubescence not longer than on rest of body; prosternum more sparsely punctate, and the pubescence shorter and sparser; tibiae unarmed at apex; and the tarsal claws cleft near the middle, the inner tooth slightly shorter than outer one, and feebly turned inward.

Redescribed from the male lectotype No. 3484, in the Philadelphia Academy of Natural Sciences.

Type locality.—San Diego, California.

DISTRIBUTION

Material examined:

CALIFORNIA: San Diego (G. H. Field). San Diego County, May 28, 1923; Warners, May 28, 1923 (Warwick Benedict). Havilah, Kern County, June 11, 1913 (H. C. Fall). Whittier, June 8, 1917 (——).

Variations.—Scarcely any variation was observed in the specimens examined except that some examples are slightly more cupreous than others and the length varies from 6 to 7.5 millimeters.

Host.—Unknown.

Horn described this species as having the antennae serrate from the fourth joint, and assigned it to the wrong section of his table, instead of placing it in the section having the antennae serrate from the fifth joint.

89. AGRILUS FLORIDANUS Crotch

Agrilus floridanus CROTCH, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 94.—SCHWARZ Proc. Amer. Philos. Soc., vol. 17, 1878, p. 452.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 328-329.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67.—WICKHAM, Bull. Buffalo Soc. Nat. Hist., vol. 9, 1909, p. 401.—BLATCHLEY, Canad. Ent., vol. 51, 1919, p. 29.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 223.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 63.

Male.—Form moderately robust, subcylindrical, feebly flattened above, rather strongly shining; head feebly aeneous anteriorly, becoming cupreous on vertex and occiput; pronotum and elytra uniformly bright reddish cupreous, with a feeble aeneous tinge, and each elytron ornamented with three pubescent spots; beneath slightly more aeneous and shining than above.

Head with the front rather wide, feebly convex, and distinctly wider at top than at bottom, the lateral margins strongly, obliquely expanded from bottom to top, with a broad, triangular depression on vertex, and a narrow groove exending from it to near the epistoma; surface coarsely, irregularly rugose, sparsely, coarsely punctate between the rugae, and sparsely clothed with moderately long, recumbent, whitish hairs; epistoma slightly transverse between the antennae, and broadly, rather deeply, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fifth joint, and the outer joints slightly wider than long; eyes rather large, elongate, and equally rounded above and beneath.

Pronotum slightly wider than long, feebly narrower at base than apex, and widest near middle; sides feebly, arcuately rounded from apical angles to behind middle, then more strongly narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are strongly sinuate, broadly separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base feebly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk rather strongly convex, with a broad, feeble depression in front of scutellum, a broad, moderately deep, oblique depression on each side along lateral margin, and with feebly indicated, obtuse, straight, prehumeral carinae; surface coarsely, densely, irregularly rugose, sparsely, finely punctate between the rugae, and sparsely clothed toward the sides with short, recumbent hairs. Scutellum strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra about as wide as pronotum at base, and equal in width at base and behind middle; sides nearly parallel for a short distance behind the base, feebly, broadly constricted near middle, broadly arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and feebly serrulate; sides of abdomen broadly exposed above; disk slightly flattened, sutural margins elevated from middle to apex, and with broad, moderately deep basal depressions; surface densely, coarsely, imbricate-punctate, sparsely, uniformly clothed with short, inconspicuous white hairs, and each elytron ornamented with sparsely pubescent spots as follows: One in basal depression, one in front of middle, and the other at apical third.

Abdomen obsoletely granulose, rather densely, finely punctate, the punctures connected transversely by fine, sinuate lines, which are coarser on the first two segments, sparsely clothed with short, inconspicuous hairs, and with vague pubescent spots at the sides of the last three segments; first and second segments feebly, longitudinally depressed, and clothed with a few long hairs at the middle; last segment broadly rounded at apex; vertical portions of segments more densely pubescent than ventral surface; pygidium sparsely punctate, feebly carinate at middle, but the carina not projecting. Prosternum finely, densely punctate, and rather densely clothed with long semierect, whitish pubescence; prosternal lobe broad, moderately declivous, and broadly truncate or vaguely emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a distinct tooth on inner margin of apex. Posterior tarsi slightly more than one-half as long as tibiae, and the first joint subequal in length to the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward. Genitalia similar to those of *impexus* Horn.

Length, 7 mm.; width, 1.75 mm.

Female.—Differs from the male in having the head uniformly reddish cupreous; first and second abdominal segments convex at middle; prosternum more sparsely punctate, and more sparsely clothed with long, semierect, whitish hairs, and the anterior and middle tibiae without a distinct tooth on inner margin at apex.

Redescribed from the male type, No. 2712, in the Philadelphia Academy of Natural Sciences.

Type locality.—Florida.

DISTRIBUTION

Material examined:

FLORIDA: Tampa, April 4–17 (Hubbard and Schwarz), May 2, 1908 (Van Duzee). Sanford, June 2 (E. D. Ball). Cleveland, April 26 (Knull and DeLong). Dunedin, April 10–13, 1923 (W. S. Blatchley). Lake Ashly, August 7 (Hubbard and Schwarz).

Variations.—None observed except in size, which varies in length from 5.5 to 7 millimeters.

Host.—The larval habits are unknown, but Chittenden (1900) records the adults on oak (*Quercus* sp.) and Blatchley (1919) records collecting the adults by sweeping huckleberry and other low shrubs during the latter part of March.

This species seems to be rare in collections and so far has only been recorded from Florida. It resembles the cupreous specimens of *impexus* Horn, but can be separated from that species, as well as from all other known species having the antennae serrate from the fifth joint, the pronotum with prehumeral carinae, and the pubescence forming spots on the elytra, by the sides of the prosternal process being parallel to each other to behind the coxal cavities.

90. AGRILUS IMPEXUS Horn

Figure 67

Agrilus impexus HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 327–328.—STROMBERG, Canad. Ent., vol. 26, 1894, pp. 36–37 (identification ?, probably *pseudofallax* Frost or *egeniformis* Champlain and Knull).—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68 (probably *pseudofallax* Frost or *egeniformis* Champlain and Knull).—FALL, Calif. Acad. Sci., Occasional Papers, no. 8, 1901, p. 242.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 223 (probably *pseudofallax* Frost or *egeniformis* Champlain and Knull).—CHAMBERLIN, Cat. Buprestidae, 1926, p. 66 (part).

Female.—Form moderately robust, subcylindrical, feebly flattened above, and moderately shining; head bronzy brown, becoming more or less cupreous on the occiput; pronotum and elytra cupreous, with a more or less aeneous tinge, and each elytron ornamented with three pale yellow pubescent spots; beneath bronzy green, with a feeble cupreous reflection, and more shining than above.

Head with the front rather wide, and slightly wider at top than at bottom, the lateral margins feebly, obliquely expanded from bottom to top, broadly, rather deeply concave on vertex, and with a feeble median groove extending from occiput to epistoma; surface sparsely, coarsely punctate, irregularly rugose, and rather sparsely clothed anteriorly with long, recumbent, yellowish pubescence; epistoma slightly transverse between the antennae, and broadly, rather deeply, arcuately emarginate in front; antennae extending nearly to middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes large, broadly oblong, and about equally rounded above and beneath.

Pronotum nearly as long as wide, feebly narrower at base than apex, and widest near middle; sides vaguely rounded from apical angles to behind middle, then more strongly narrowed to near the base, where they are strongly sinuate, and the posterior angles rectangular; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina feebly sinuate, the two carinae widely separated anteriorly, and connected to each other near base; anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base slightly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum, disk moderately convex, with two broad, vague median depressions, a broad, deep, oblique depression on each side along lateral margin, and with obtusely rounded, moderately long, sinuate prehumeral carinae; surface obsoletely granulose, densely, coarsely rugose, the rugae transverse at middle but becoming oblique toward the sides, sparsely, finely punctate between the rugae, and sparsely clothed at the sides with short, inconspicuous hairs. Scutellum transversely carinate, and the surface finely, densely reticulate.

Elytra about as wide as pronotum at base, and equal in width at base and behind middle; sides nearly parallel for a short distance behind base, feebly, broadly constricted near middle, broadly arcuately expanded behind middle, then narrowed to the tips, which are separately, narrowly rounded, and strongly serrulate; sides of abdomen broadly exposed above; disk slightly flattened, sutural margins elevated posteriorly, and with broad, moderately deep basal depressions; surface coarsely, densely imbricate-punctate, sparsely clothed posteriorly with short, inconspicuous, white hairs, and each elytron ornamented with sparsely pubescent spots as follows: One in basal depression, an elongate one in front of middle, and the other at apical third.

Abdomen beneath obsoletely granulose, rather densely, finely punctate, the punctures connected transversely by fine, sinuate lines, which are coarser on the basal segment, sparsely clothed with short, recumbent, white hairs, with a more densely pubescent spot at the sides of the third, fourth, and fifth segments; first and second segments convex at middle; last segment broadly rounded at apex; vertical portions of first and second segments densely pubescent; pygidium feebly carinate, but the carina not projecting. Prosternum finely, densely punctate, and rather sparsely clothed with long, recumbent, whitish pubescence; prosternal lobe broad, moderately declivous, and broadly, vaguely emarginate or subtruncate in front; prosternal process broad, the sides slightly expanded behind the coxal cavities, and truncate at apex. Tibiae slender, anterior pair slightly arcuate, and all pairs without a tooth at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Length, 7 mm.; width, 1.9 mm.

Male.—Differs from the female in having the front of head bronzy green anteriorly, and more densely pubescent; eyes more broadly oval; antennae slightly longer; first and second abdominal segments feebly sulcate their entire length, and the pubescence longer and more erect in the depression; prosternum densely clothed with long, erect, whitish hairs, and the anterior and middle tibiae armed with a short tooth on inner margin at apex.

Redescribed from the female lectotype No. 3494 in the Philadelphia Academy of Natural Sciences.

Type locality.—Nebraska.

DISTRIBUTION

Material examined:

ARIZONA: Catalina Springs, reared, April (Hubbard and Schwarz).

ARKANSAS: Paratype, no definite locality.

COLORADO: Colorado Springs, June 15–30, 1896 (H. F. Wickham).

KANSAS: Onaga, July–August (H. C. Fall). Baldwin, July (Bridwell). Lawrence, June 2, 1911 (——). Topeka, August 3; Riley County, June–July (Popenoe). Douglas and Morton Counties (F. H. Snow). Miami, Cowley, Allen, and Linn Counties (R. H. Beamer). Smith County (H. Deny).

MINNESOTA: Fort Snelling, June 28, 1923 (MacAndrews).

MISSISSIPPI: Agricultural College, July 29, 1922 (Hull).

NEBRASKA: Lectotype, no definite locality.

TEXAS: No definite locality (Belfrage).

WYOMING: Lusk, July 1895 (——).

Also recorded from Illinois: Galesburg (Stromberg, Chittenden). This is probably wrongly identified and should be *pseudofallax* Frost.

Variations.—Notwithstanding the wide area over which this species is distributed, there seems to be very little variation, except in color and size. The color varies from olivaceous green to reddish cupreous, and rarely a specimen is found which has a distinct bluish tinge. Length 6.5 to 7.5 millimeters. The two examples from Arizona are not quite typical, being slightly more slender and are only 5 millimeters in length, but agree in all other respects with the typical specimens.

Host.—Nothing is known of the larval habits of the typical form, but the two specimens mentioned above from Arizona were reared from " Palo verde " (*Parkinsonia microphylla* Torrey). Stromberg (1894) and Chittenden (1900) record the adults on Honey Locust (*Gleditsia triacanthos* Linnaeus) and Black Locust (*Robinia pseudoacacia* Linnaeus) but these records are probably from erroneously identified specimens and are probably *pseudofallax* Frost.

This species resembles *floridanus* Horn very closely, but in that species the sides of the prosternal process are parallel to each other to behind the coxal cavities, whereas in *impexus* the sides are expanded behind the coxal cavities.

91. AGRILUS CUPREONITENS, new species

Figure 68

Male.—Form moderately robust, subcylindrical, slightly flattened above, and rather strongly shining; head aureous, with a feeble cupreous tinge on the front, and becoming reddish cupreous on the occiput; pronotum brownish cupreous, with a feebly greenish reflection; elytra reddish cupreous, and each elytron ornamented with three vague pubescent spots; beneath reddish cupreous, and strongly shining.

Head with the front rather broad, nearly flat, about equal in width at top and bottom, the lateral margins feebly, arcuately expanded above the middle, and with a broad, moderately deep depression extending from the occiput to epistoma; surface densely, finely granulose, coarsely, irregularly rugose, and without distinct pubescense; epistoma narrow between the antennae, broadly, deeply arcuately emarginate in front, and the clypeal suture indistinct; antennae serrate from the fifth joint (outer joints missing); eyes rather large, broadly oval, and about equally rounded above and beneath.

Pronotum nearly one-third wider than long, equal in width at base and apex, and widest at middle; sides nearly parallel, or vaguely rounded from apical angles to base: when viewed from the side the marginal and submarginal carinae are feebly sinuate, narrowly separated anteriorly, and connected to each other behind the middle; anterior margin slightly sinuate, and the median lobe feebly, broadly rounded; base arcuately emarginate at middle of each elytron, the median lobe strongly produced, and broadly emarginate in front of scutellum; disk moderately convex, with a narrow median depression extending from near the anterior margin to the base, and broader and more deeply depressed behind the middle, with a broad, vague depression on each side along the lateral margin, and with very vague, obtuse, prehumeral carinae; surface densely, finely granulose, finely, distantly, and irregularly rugose, finely, sparsely punctate between the rugae, and clothed with a few scattered hairs. Scutellum transversely, arcuately carinate, and the surface finely, densely reticulate.

Elytra about as wide as pronotum at base, and slightly wider at base than at apical third; sides feebly expanded for a short distance behind base, broadly, vaguely constricted in front of middle, vaguely expanded behind the middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and coarsely serrulate; sides of abdomen broadly exposed above; disk slightly flattened, more or less broadly depressed along the sutural margins, which are strongly elevated at apical third, and with broad, shallow, basal depressions; surface coarsely, densely imbricate-punctate, and each elytron ornamented with three vague pubescent spots, one in the basal depression, one in front of middle, and one at apical third.

Abdomen beneath sparsely, finely punctate, the punctures connected transversely by sinuate lines, which are coarser on the basal segments, and sparsely, uniformly clothed with short, recumbent, white hairs; first segment slightly flattened, and clothed with a few longer hairs at the middle; vertical portions of the segments not conspicuously pubescent; pygidium not carinate posteriorly. Prosternum finely, densely punctate, somewhat rugose, and sparsely clothed with moderately long, semierect, white hairs; prosternal lobe broad, moderately declivous, and broadly subtruncate in front; prosternal process broad, vaguely expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, straight, and the anterior and middle pairs armed with a very small tooth on inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint not as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth shorter than the outer one, and not turned inward.

Female.—Differs from the male in having the front of head uniformly coppery red and not granulose, the first abdominal segment convex at middle, the prosternum clothed with short, recumbent hairs, and the tibiae without a distinct tooth at apex.

Length, 4.75 mm.; width, 1.25 mm.

Type locality.—Brownsville, Tex.

Type and allotype.—Cat. No. 41013, U.S.N.M.

Described from a male and female collected at the type locality, April 28, by H. S. Barber.

This species resembles *addendus* Crotch and *abjectus* Horn, but can be separated from the former by having a distinct median depression on the pronotum, the basal and median pubescent spots on the elytra not connected, and the head glabrous in both sexes, and from *abjectus* it differs in having the pronotum only moderately convex, with a distinct, elongate median depression, and the color above is reddish cupreous.

92. AGRILUS ADDENDUS Crotch

Agrilus addendus Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 95.—Waterhouse, Biol. Centr.-Amer., Coleopt., vol. 3, pt. 1, 1889, p. 86.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 329–330; Proc. Calif. Acad. Sci., vol. 4, ser. 2, 1894, p. 329.—Fall and Cockerell, Trans. Amer. Ent. Soc., vol. 33, 1907, pp. 152, 181.—Blatchley, Coleoptera of Indiana, 1910, p. 804 (probably *pseudofallax* Frost, or *egeniformis* Champlain and Knull).—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 223 (probably *pseudofallax* Frost, or *egeniformis* Champlain and Knull).—Van Dyke, Bull. Brooklyn Ent. Soc., vol. 18, 1923, p. 41.—Chamberlin, Cat. Buprestidae, 1926, p. 48 (part).

Male.—Form moderately robust, subcylindrical, feebly flattened above, subopaque; head aeneo-cupreous; pronotum and elytra uniformly reddish or brownish cupreous, with a more or less distinct aeneous tinge on some parts, and each elytron ornamented with three pubescent spots; beneath similar in color but more shining than above.

Head with the front rather wide, feebly convex, slightly wider at top than at bottom, the lateral margins vaguely, arcuately expanded near middle, and with a rather deep, broad, concave depression extending from occiput to epistoma; surface densely, finely granulose, sparsely punctate, coarsely, irregularly rugose, and rather densely clothed with long, recumbent, whitish pubescence; epistoma not transverse between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending nearly to middle of pronotum, serrate from the fifth joint, and the outer joints as wide as long; eyes large, broadly oval, and equally rounded above and beneath.

Pronotum about one-fifth wider than long, feebly narrower at base than apex, and widest near middle; sides vaguely rounded from apical angles to behind middle, then more strongly narrowed to near the base, where they are slightly sinuate, and the posterior angles rectangular; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina nearly straight, more or less obliterated behind middle, and the two carinae broadly separated anteriorly; anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base slightly emarginate at middle of each elytron, the median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, with two very vague median depressions, a broad, moderately deep, oblique depression on each side along lateral margin, and with rather distinct, straight prehumeral carinae; surface obsoletely granulose, coarsely, densely, transversely rugose at middle, finely, sparsely punctate between the rugae, and sparsely clothed with short, recumbent, yellowish-white pubescence. Scutellum feebly, transversely carinate, and the surface densely, finely reticulate.

Elytra about as wide as pronotum at base, and slightly wider at base than behind the middle; sides vaguely rounded for a short distance behind base, broadly, vaguely constricted near middle, feebly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, rather narrowly rounded, and feebly serrulate; sides of abdomen broadly exposed above; disk feebly flattened, with a vague depression along the sutural margins which are slightly elevated posteriorly, and with broad, shallow basal depressions; surface finely, densely imbricate-punctate, sparsely, uniformly clothed with short, recumbent, whitish pubescence, and each elytron ornamented with more or less distinct yellowish white pubescent spots as follows; one in basal depression, one in front of middle, and the other at apical third.

Abdomen beneath finely, sparsely punctate, the punctures connected transversely by fine, sinuate lines, which are coarser on basal segment, sparsely clothed with moderately long, recumbent, white pubescence, and with more densely pubescent spots at the sides of the last three segments; first and second segments very vaguely, longitudinally depressed at the middle, and clothed with longer pubescence; last segment broadly rounded at apex; vertical portions of first two segments more densely pubescent than ventral surface; pygidium sparsely punctate, feebly carinate, but the carina not projecting. Prosternum finely, sparsely punctate, and densely clothed with long, erect, fine, whitish hairs; prosternal lobe broad, strongly declivous, and broadly but feebly emarginate in front; prosternal process broad, the sides slightly expanded behind the coxal cavities, and truncate at apex. Tibiae slender, anterior pair slightly arcuate, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broader and shorter than outer one, and not turned inward. Genitalia similar to *impexus* Horn.

Length, 6 mm.; width, 1.75 mm.

Female.—Differs from the male in having the front of head more reddish cupreous, broader, equal in width at top and bottom, and the lateral margins parallel; outer joints of antennae slightly wider than long; first and second abdominal segments without a median depression; prosternum without long, erect hairs at middle, and the tibiae unarmed at apex.

Redescribed from the male cotype No. 1 in the Museum of Comparative Zoology, and the female cotype No. H–4737 in the Philadelphia Academy of Natural Sciences.

Type locality.—Texas.

DISTRIBUTION

Material examined:

ARIZONA: Catalina Springs, April 18 (Hubbard and Schwarz). Santa Rita Mountains, 5,000–8,000 feet, July (F. H. Snow). Palmerlee, July 22 (H. A. Wenzel).

NEW MEXICO: Highrolls, May 29, 1902; Alamogordo, April 29, 1902 (——). La Cueva, Organ Mountains (C. H. T. Townsend).

TEXAS: Loma, July 7, 1908 (——). San Diego, May 31 (Hubbard and Schwarz). Cypress Mills, March 15 (——). Chisos Mountains, Brewster County, June 10–12, 1908 (Mitchell and Cushman). Devil's River, May 2–4, 1907 (Pratt, Bishopp, and Schwarz). Corpus Christi, March–April, 1907 (C. S. Spooner, R. A. Cushman). San Antonio, May 10, 1907 (E. A. Schwarz). Brownsville (J. C. Bridwell). Austin, April 9, 1909 (R. A. Cushman). Plano, July, 1907 (E. S. Tucker). Beeville, May (E. A. Schwarz, W. D. Pierce).

Also recorded from:

LOWER CALIFORNIA: Coral de Piedra and Sierra El Taste (Horn).

MEXICO: Northern Sonora (Morrison).

INDIANA: Posey and Perry Counties (Blatchley). This is probably a wrong identification and should be *pseudofallax* Frost.

Variations.—The color is rather constant in this species. The median depression on the pronotum is, at best, only feebly indicated, but in some specimens it is entirely wanting, and in others there are two vague depressions at the middle. The pubescence on the upper surface is more distinct in some specimens than in others, sometimes scarcely forming spots, and varies in color from white to yellowish white. The basal and median pubescent spots on the elytra are usually connected, forming a more or less distinct vitta on basal half. Length 4 to 6 millimeters.

Host.—Unknown. Blatchley (1910) records collecting the adults on peach blossoms in Indiana, but this record is probably from erroneously identified specimens, and probably should refer to *pseudofallax* Frost.

This species is very closely allied to *impexus* Horn, and some examples will be difficult to separate, but *addendus* is usually smaller, the elytra more uniformly pubescent posteriorly, the pubescent spots not distinct, often obsolete, and the basal and median spots usually connected to each other and forming a more or less distinct vitta on basal half, whereas in *impexus* the pubescent spots are distinct, and the basal and median ones are not connected. The male genitalia of the two species are nearly identical, and it is just possible that when the biology of both species is known they may prove to be only extreme forms of the same species, but until these habits are known, it is advisable to retain them as valid species. The two cotypes in the LeConte and Horn collections were both collected by Belfrage in Texas. Specimen No. 2 in the LeConte collection labeled "*addendus* Cr. type 5079–2" is *abjectus*, Horn, and not *addendus*.

93. AGRILUS QUERCUS Schaeffer

Figure 69

Agrilus quercus Schaeffer, Brooklyn Inst. Mus., Sci. Bull., vol. 1, no. 7, 1905, pp. 150–151.—Frost and Weiss, Canad. Ent., vol. 53, 1921, p. 72.—Chamberlin, Cat. Buprestidae, 1926, p. 79.

Male.—Form moderately elongate, rather strongly flattened above, and feebly shining; head opaque, reddish brown in front, and becoming darker brown on the occiput, pronotum and elytra dark brown, with a cupreous or aeneous tinge, and the elytra ornamented with more or less distinct pubescent spots or designs; beneath reddish cupreous, and more shining than above.

Head with the front rather narrow, feebly convex, slightly wider at bottom than at top, the lateral margins feebly, broadly constricted near the middle, and with a narrow, vague, longitudinal groove extending from occiput to middle of front; surface densely, finely granulose, sparsely punctate, longitudinally rugose on occiput, and rather sparsely clothed with long, recumbent, silvery white pubescence; epistoma strongly transverse between the antennae, and broadly but not deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes large, oblong, and more acutely rounded beneath than above.

Pronotum one-fourth wider than long, slightly narrower at base than apex, and widest at apical third; sides feebly, arcuately rounded from apical angles to middle, then more strongly narrowed to near the posterior angles, where they are sinuate, and the angles rectangular; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina nearly straight, the two carinae widely separated anteriorly, and narrowly separated posteriorly to the base; anterior margin strongly sinuate, the median lobe strongly, broadly rounded; base strongly emarginate at middle of each elytron, the median lobe strongly, broadly rounded, and arcuately emarginate in front of scutellum; disk moderately convex, with a broad median depression extending from base to near anterior margin, a broad, deep, oblique depression on each side along lateral margin, and with sharply defined, sinuate prehumeral carinae extending from posterior angles to near middle; surface coarsely, strongly, more or less transversely rugose, sparsely, finely punctate between the rugae, and sparsely clothed with short, whitish hairs toward the sides. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra about as wide as pronotum at base, and subequal in width at base and behind middle; sides nearly parallel for a short distance behind base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and strongly serrulate; sides of abdomen narrowly exposed above; disk feebly, longitudinally, concave along the sutural margins, causing a more or less distinct costa on each elytron, sutural margins rather strongly elevated from basal third to apex, and with broad, deep basal depressions; surface densely, coarsely, imbricate-punctate, and each elytron ornamented with more or less distinct, white pubescent spots as follows: A round spot in basal depression, an elongate spot in front of middle, a small round spot at apical third, and the spots more or less connected laterally by irregularly distributed, short, white hairs.

Abdomen beneath obsoletely granulose, sparsely, finely punctate, the punctures connected transversely by more or less distinct, sinuate lines, which are coarser and denser on the basal segments, and sparsely, uniformly clothed with moderately long, recumbent, white hairs; first segment feebly concave, more deeply depressed posteriorly, the suture between first and second segments visible at middle, and elevated into a feebly, obtuse elevation on each side of the depression; last segment broadly rounded at apex; vertical portions of segments not conspicuously pubescent; pygidium strongly carinate anteriorly, but the carina not projecting. Prosternum densely, coarsely rugose, and sparsely clothed with long, semierect, white hairs at middle; prosternal lobe broad, feebly declivous, and broadly rounded in front; prosternal process broad, the sides parallel to behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, straight, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint about as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than the outer one, and not turned inward.

Length, 6.5 mm.; width, 1.75 mm.

Female.—Differs from the male in having the front of head darker brown and broader, equal in width at top and bottom, and the lateral margins parallel to each other; prosternum not quite so densely pubescent; first abdominal segment convex at middle, and without a median depression, and the tibiae without a distinct tooth on inner margin at apex.

Redescribed from the male and female cotypes, Catalogue No. 255, in the collection of the Museum of the Brooklyn Institute of Arts and Sciences.

Type locality.—Palmerlee, Ariz.

DISTRIBUTION

Material examined:

ARIZONA: Palmerlee, Cochise County, June 27–July 29 (C. Schaeffer); July 22 (H. A. Wenzel). Huachuca Mountains, July 27–31 (C. Schaeffer).

Variations.—The color is rather constant in the specimens examined. The pubescence is more or less variable, usually forming irregular designs, but when part is lost by abrasion, the specimens might be placed with those species having pubescent spots on the elytra. Length 5.5 to 7.5 millimeters.

Host.—The larval habits are not known, but Schaeffer has collected the adults on oak (*Quercus* sp.) from which the species is named.

This species resembles *lecontei* Saunders, but can be easily distinguished from that species by having the prosternal lobe broadly rounded in front, whereas in *lecontei* it is deeply, arcuately emarginate. From those species having pubescent spots on the elytra, it can be separated by having the front of the head convex, the pronotum depressed at the middle, and the marginal and submarginal carinae on the pronotum separated for their entire length.

94. AGRILUS PALMACOLLIS Horn

Figure 70

Agrilus palmacollis HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 326.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68 (part).—GRIFFITH, Ent. News, vol. 11, 1900, p. 568.—FALL, Calif. Acad. Sci., Occasional Papers, no. 8, 1901, p. 241.—FALL and COCKERELL, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 181.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 222 (part).—CHAMBERLIN, Cat. Buprestidae, 1926, p. 76 (part).

Agrilus palmaticollis KERREMANS, Wytsman's Gen. Insectorum, fasc. 12, pt. 4, 1903, p. 288 (typographical error).

Female.—Moderately elongate and shining; head dark reddish brown; pronotum and elytra piceous, with a strong aeneous or cupreous tinge, and each elytron ornamented with three pubescent spots; beneath similar to above, but more shining.

Head with the front rather wide, moderately convex and shining, about equal in width at top and bottom, the lateral margins nearly parallel, and with a feeble longitudinal groove extending from occiput to middle of front; surface finely, sparsely punctate, strongly rugose, and sparsely clothed with short, recumbent, silvery white hairs; epistoma transverse between the antennae, and broadly but not deeply, arcuately emarginate in front; antennae extending nearly to middle of pronotum, serrate from the fifth joint, and the outer joints slightly wider than long; eyes large, broadly oblong, and slightly more acutely rounded beneath than above.

Pronotum one-fourth wider than long, distinctly narrower at base than apex, and widest near middle; sides arcuately rounded from apical angles to behind middle, then strongly, obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are nearly straight, scarcely deflexed in front, and narrowly separated from each other for their entire length; anterior margin rather strongly sinuate, and with a broadly rounded median lobe; base rather strongly emarginate at middle of each elytron, with the median lobe broadly rounded, and feebly emarginate in front of scutellum; disk moderately convex, without a distinct median depression, but with a broad, vague depression on each side along lateral margin, and with short, vague, obtusely rounded, prehumeral carinae; surface very obliquely rugose, the rugae widely separated, finely, sparsely punctate between the rugae, sparsely clothed with short, recumbent hairs toward the sides, and with a distinct opaque, granulose area at middle along anterior margin. Scutellum strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra slightly wider than pronotum at base, and only vaguely wider at base than behind middle; sides nearly parallel from base to apical third (feebly, arcuately constricted near middle), then obliquely attenuate to the tips, which are separately, rather narrowly rounded and strongly serrulate; sides of abdomen broadly exposed above; disk slightly flattened, feebly, longitudinally depressed along sutural margins, which are slightly elevated posteriorly, and with broad, moderately deep, basal depressions; surface coarsely imbricate-punctate, sparsely clothed with short, inconspicuous hairs, and each elytron ornamented with three elongate spots of rather densely placed long, recumbent, yellowish white hairs, one in basal depression, one in front of middle, and the other at apical third.

Abdomen beneath finely, densely granulose, finely, sparsely punctate, the punctures connected transversely by fine sinuate lines, which are coarser on the basal segments, and sparsely, uniformly clothed with short, recumbent, white hairs; first segment convex at middle;

last segment broadly rounded at apex; vertical portions of first segment densely clothed with recumbent, silvery white pubescence; pygidium feebly carinate, but the carina not projecting. Prosternum sparsely, finely punctate, and sparsely clothed with recumbent, whitish hairs; prosternal lobe broad, slightly declivous, and broadly rounded or subtruncate in front; prosternal process broad, the sides slightly expanded behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, straight, and without a tooth at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint scarcely as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, about one-half as long as outer one, and not turned inward.

Length, 4.9 mm.; width, 1.3 mm.

Male.—Differs from the female in having the front of head narrower, less convex, slightly wider at bottom than at top, the lateral margins more strongly constricted below the middle, and the surface aeneous or cupreous, subopaque, densely granulose, and rather densely clothed with long, recumbent, whitish hairs; eyes more broadly oblong, and about equally rounded beneath and above; prosternum densely clothed with long, fine, erect hairs; first abdominal segment broadly, longitudinally concave at middle, the concavity not very deep or densely pubescent, and the anterior and middle tibiae armed with a short tooth on inner margin at apex.

Redescribed from the female lectotype No. 3492 in the Philadelphia Academy of Natural Sciences.

Type locality.—Southern Arizona.

DISTRIBUTION

Material examined:

ARIZONA: Hot Springs, June 25 (Barber and Schwarz). Phoenix (——).

CALIFORNIA: Yuma, April 22, 1908 (——).

NEW MEXICO: Alamogordo, May 10, 1902 (H. L. Viereck). Wootens (W. Knaus).

TEXAS: San Antonio, May 31, 1905 (A. C. Morgan). Devils River, May 4, 1907; Beeville, April 22; San Diego, April 29 (E. A. Schwarz). Sanderson, May 9, 1912 (D. J. Mitchell). Laredo, March 26, 1908; Cotulla, March 28, 1908 (Jones and Pratt).

Variations.—The numerous specimens examined are rather constant in appearance, varying in length from 3 to 4.5 millimeters, and the pubescent spots may be more or less abraded.

Hosts.—Chittenden (1900) records this species having been reared from twigs and branches of Mesquite (*Prosopis juliflora* (Swartz) de Candolle) and Huisache (*Acacia farnesiana* (Linnaeus) Willdenow) by E. A. Schwarz at San Antonio and Brownsville, Tex. One of these plants is probably the host plant for *prosopidis* Fisher, as all of the specimens taken by Schwarz at San Diego are *palmacollis*, and those from Brownsville are *prosopidis*, but the specimens are not labeled with the host plant from which they were reared. Probably *palmacollis* is from the Mesquite as adults have been collected a number of times on that plant.

95. AGRILUS PROSOPIDIS, new species

Figure 71

Agrilus palmacollis Chittenden, U. S. Dept. Agric., Div. Ent., Bull 22, new ser., 1900, p. 68 (part).—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 222 (part).—Chamberlin, Cat. Buprestidae, 1926. p. 76 (part).

Male.—Form small, moderately elongate, slightly flattened above, and rather strongly shining; head bright green, becoming cupreous or aeneous on the occiput, pronotum and elytra dark brown, with a distinct cupreous or aeneous tinge, and the elytra ornamented with more or less distinct pubescent spots; beneath cupreous, slightly more shining than above, and the legs varying from bright green to bronzy green.

Head with the front moderately wide, rather strongly convex, slightly wider at bottom than at top, the lateral margins broadly, arcuately constricted below the middle, and without a distinct median groove; surface finely, densely granulose (some of the granules larger and more shining), feebly, sparsely punctate, longitudinally rugose on the occiput, and with a few short, inconspicuous hairs behind the epistoma; epistoma not transverse between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes large, broadly oval, and equally rounded above and beneath.

Pronotum one-fourth wider than long, about equal in width at base and apex, and widest at middle or in front of middle; sides more or less arcuately rounded anteriorily, more strongly narrowed posteriorly, and the posterior angles nearly rectangular; when viewed from the side the marginal carina is feebly sinuate, the submarginal carina nearly straight, and the two carinae separated for their entire length; anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base slightly emarginate at middle of each elytron, the median lobe feebly, broadly rounded, and vaguely emarginate in front of scutellum; disk moderately convex, with a broad, vague median depression extending from base to near the anterior margin, a broad, shallow depression on each side along lateral margin, and with distinct, short, straight prehumeral carinae; surface vaguely granulose, coarsely, transversely rugose at middle, the rugae becoming more longitundinal at the sides, finely, sparsely punctate between the rugae, and glabrous. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and wider at base than behind the middle; sides feebly rounded for a short distance behind base, broadly, arcuately constricted in front of middle, feebly expanded behind the middle, then strongly narrowed to the tips, which are separately, broadly rounded, and rather strongly serrulate; abdomen narrowly exposed above; disk vaguely, longitudinally concave along the sutural margins, which are strongly elevated posteriorly, and with broad, shallow basal depressions; surface densely, coarsely imbricate-punctate, and each elytron ornamented with more or less distinct white pubescent spots as follows: A small spot in basal depression, an elongate spot along suture in front of middle, a vague, elongate spot near the apex, where the surface is sometimes clothed with a few very short, scattered, white hairs.

Abdomen obsoletely granulose, finely, sparsely punctate, the punctures connected transversely by more or less distinct sinuate lines, and sparsely clothed with short, recumbent, white hairs; first segment feebly flattened, and with a small, vague, median depression at the posterior margin; last segment broadly rounded at apex; vertical portions of the first segment densely clothed with white pubescence; pygidium feebly carinate anteriorly, but the carina not projecting. Prosternum obsoletely granulose, sparsely, finely punctate, and sparsely clothed with long, semierect, silvery white hairs; prosternal lobe broad, moderately declivous, and broadly subtruncate in front; prosternal process rather narrow, the sides feebly expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, straight, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer tooth, and not turned inward.

Female.—Differs from the male in having the head of a uniform bright reddish mahogany color, front slightly broader, the lateral margins nearly parallel, and the surface less distinctly granulose and more rugose on the front; first abdominal segment convex, without a median depression; prosternum without long, erect pubescence at middle, and the tibiae unarmed at apex.

Length, 3.5–4.5 mm.; width, 1–1.25 mm.

Type locality.—Brownsville, Tex.

Other localities.—San Antonio, Tex.

Type, allotype, and paratypes.—Cat. No. 41009, U.S.N.M.

Described from 23 examples (one type). Type, allotype, and six paratypes collected at the type locality, March 18–20, 1908, by Jones and Pratt; one paratype collected May 10, 1907 at San Antonio, by E. A. Schwarz; and the following paratypes, all of which are from the type locality: Four collected June 5–6, 1895, by E. A. Schwarz; three collected March–April, 1895, by C. H. T. Townsend; six collected April–June, 1904, by H. S. Barber, and one collected February 24, 1909, by F. C. Pratt.

This species is closely allied to *palmacollis* Horn, and is confused in collections with that species. In *prosopidis* the pronotum is rather coarsely, transversely rugose on the disk, the front of the head in the male is bright green and not pubescent, and in the female is of a bright reddish-mahogany color; whereas in *palmacollis* the pronotum is finely, obliquely rugose on the disk, the front of the head in the male is bronzy cupreous, and densely pubescent, and in the female is dark, coppery brown.

The specimens taken by Schwarz at Brownsville are part of the material recorded by Chittenden (1900) as having been reared from Mesquite (*Prosopis juliflora* (Swartz) de Candolle) and Huisache (*Acacia farnesiana* (Linnaeus) Willdenow), so one of these plants is probably the host plant of this species. Probably *prosopidis* is from the Huisache as adults have been collected on this plant.

96. AGRILUS EXIGUELLUS, new species

Figure 72

Male.—Form small, moderately elongate, slightly flattened above, and rather strongly shining; head dark bronzy green, becoming brownish cupreous on the occiput; pronotum and elytra dark brown, with a feeble cupreous reflection, and each elytron ornamented with three vague pubescent spots; beneath similar in color to above, but slightly more shining.

Head with the front rather wide, feebly convex, about equal in width at bottom and top, the lateral margins nearly parallel (feebly constricted near bottom), and with a vague, narrow, longitudinal groove on the vertex and occiput; surface densely, finely granulose, sparsely, feebly punctate, longitudinally rugose on the occiput, and sparsely, uniformly clothed with short, semierect silvery white pubescence; epistoma slightly transverse between the antennae, and broadly, rather deeply, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fifth joint, and the outer joints as wide as long; eyes rather large, broadly oval, and slightly more acutely rounded beneath than above.

Pronotum one-third wider than long, about equal in width at base and apex, and widest near middle; sides slightly arcuately rounded from apical angles to behind the middle (sometimes nearly parallel at middle), then more strongly narrowed to near the posterior angles where they are parallel; when viewed from the side the marginal carina is slightly sinuate, the submarginal carina nearly straight, the two carinae widely separated anteriorly, and connected to each other behind the middle; anterior margin slightly sinuate, and the median lobe broadly but not strongly rounded; base feebly emarginate at middle of each elytron, the median lobe feebly, broadly rounded, and subtruncate in front of scutellum; disk moderately convex, with a broad, vague, elongate median depression, a shallow, oblique depression on each side along lateral margin, and with sharply defined, sinuate prehumeral carinae, extending from base to near the middle; surface obsoletely granulose, coarsely, transversely rugose at middle, and sparsely, finely punctate between the rugae. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and equal in width at base and behind middle; sides nearly parallel for a short distance behind base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and strongly serrulate; sides of abdomen narrowly exposed above; disk feebly, longitudinally depressed along sutural margins at middle, sutural margins strongly elevated posteriorly, and with broad, shallow basal depressions; surface coarsely, densely imbricate-punctate, sparsely clothed with short, inconspicuous hairs, and each elytron ornamented with indistinct pubescent spots as follows: A round spot in basal depression, an elongate one in front of middle, and a round spot at apical third.

Abdomen beneath obsoletely reticulate, finely, sparsely punctate. the punctures connected transversely by more or less distinct, sinuate lines, which are coarser on the basal segment, and sparsely, uniformly clothed with short, recumbent, white hairs; first and second abdominal segments feebly concave at middle, the concavity extending to middle of second segment, and sparsely clothed with moderately long, fine, erect hairs; last segment broadly rounded at apex; vertical portions of the segments not conspicuously pubescent; pygidium sparsely punctate, and not distinctly carinate at middle. Prosternum finely, sparsely granulose, and rather densely clothed with long, fine, erect hairs at middle, which extend along the middle of body to middle of second abdominal segment; prosternal lobe broad, moderately declivous, and broadly rounded in front; prosternal process broad, the sides slightly expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, straight, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than the outer one, and not turned inward.

Female.—Differs from the male in having the front of head uniformly mahogany red, the surface strongly shining, not distinctly granulose, feebly rugose, and with only a few white hairs behind the epistoma; antennae slightly shorter; first two abdominal segments not sulcate at middle; prosternum and middle part of body without long, erect hairs, and the tibiae unarmed at apex.

Length, 3.25–4 mm.; width, 0.8–1 mm.

Type locality.—Texas (no definite locality).

Other locality.—Belvidere, Kans.

Type, allotype, and paratypes.—Cat. No. 41011, U.S.N.M. *Paratypes* in collections of C. A. Frost and W. Knaus.

Described from 25 examples (one type). Type, allotype, and 21 paratypes from Texas, without any definite locality, nearly all of which are from the Belfrage collection, and two paratypes collected by W. Knaus, at Belvidere, Kans.

This species is closely allied to *abductus* Horn and *acaciae* Fisher, but can be separated from both these species by the pubescent spots on the elytra being indistinct and the median one usually not depressed, and also by the different shape of the male genitalia. Nothing is known about the larval habits of this species.

97. AGRILUS ACACIAE, new species

Figure 73

Male.—Form small, moderately elongate, rather strongly flattened above, and feebly shining; head subopaque, bronzy in front, becoming brownish cupreous on the occiput; pronotum and elytra olivaceous brown, with a more or less cupreous tinge, and each elytron with three purplish brown or greenish black spots along the suture, and ornamented with three pubescent spots; beneath cupreous, the legs more or less greenish, and more shining than above.

Head with front narrow, nearly flat, wider at bottom than at top, the lateral margins strongly, broadly constricted at the middle, and sometimes with a narrow, vague longitudinal groove; surface densely, finely granulose, sparsely, coarsely punctate, longitudinally rugose on occiput, and sparsely clothed with long, recumbent, white hairs; epistoma slightly transverse between the antennae, and broadly, very deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes large, broadly oval, and slightly more acutely rounded beneath than above.

Pronotum scarcely one-fourth wider than long, narrower at base than apex, and widest along apical half; sides nearly parallel or feebly narrowed from apical angles to behind the middle, then strongly narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal carina is slightly sinuate, the submarginal carina nearly straight, the two carinae rather narrowly separated at apical third, and connected to each other at apex and behind the middle; anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base rather strongly emarginate at middle of each elytron, the median lobe feebly, broadly rounded, and slightly emarginate in front of scutellum; disk moderately convex, with a broad, longitudinal median depression, sometimes feebly divided at middle, a broad, shallow depression on each side along lateral margin, and with sharply defined, straight, prehumeral carinae, extending from base to basal third; surface finely, densely granulose, subopaque, and finely, transversely rugose at middle, finely, sparsely punctate between the rugae, and sparsely clothed with white hairs at the sides. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and slightly wider at base than behind the middle; sides slightly rounded for a short distance behind base, broadly, arcuately constricted in front of middle, feebly expanded behind the middle, then strongly narrowed to the tips, which are separately, broadly rounded, and rather strongly serrulate; sides of abdomen narrowly exposed above; disk slightly, longitudinally concave along the sutural margins, which are elevated posteriorly, a vague costa on each side, and with broad, moderately deep basal depressions; surface densely, finely imbricate-punctate, sparsely clothed with short, white hair posteriorly, and each elytron ornamented with white pubescent spots as follows: a round spot in basal depression, an elongate spot in front of middle, and a smaller spot at apical third.

Abdomen beneath finely, sparsely punctate, the punctures becoming coarser and transversely rugose on basal segments, and sparsely, uniformly clothed with short, recumbent, white pubescence; first and second segments broadly, feebly, longitudinally concave at middle, and the concavity sparsely clothed with long, erect, white hairs; last segment broadly rounded or subtruncate at apex; vertical portions of the segments not conspicuously pubescent; pygidium sparsely punctate but not distinctly carinate. Prosternum rather coarsely rugose, and sparsely clothed with moderately long, erect, white hairs; prosternal lobe broad, feebly declivous, and arcuately rounded in front; prosternal process broad, the sides strongly expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute.

Tibiae slender, anterior pair slightly arcuate, and the anterior and middle pairs armed with a distinct tooth on inner margin at apex. Posterior tarsi subequal in length to tibae, and the first joint as long as the following two joints united. Tarsal claws dissimilar, anterior and middle claws cleft near the tip, and the teeth nearly equal in length; posterior claws cleft near middle, the inner tooth broad, shorter than outer one, and not turned inward.

Female.—Differs from the male in having the head reddish brown, the rugae more or less bluish black on vertex and occiput, front slightly wider, the lateral margins not quite so strongly constricted, and the surface more strongly rugose on the front; first and second abdominal segments strongly convex, not sulcate at middle, and without long pubescence; prosternum without long, erect pubescence at middle; tibiae unarmed at apex, and the tarsal claws similar on all feet, cleft near middle, the inner tooth broad, shorter than the outer one, and not turned inward.

Length, 4–5.5 mm.; width, 1–1.25 mm.

Type locality.—Brownsville (Los Borregos), Tex.

Type, allotype, and paratypes.—Cat. No. 41010, U.S.N.M.

Described from 21 examples (one type), all from the type locality. Type, allotype, and six paratypes collected April 30–May 24, 1904, by H. S. Barber, one paratype collected February 24, 1909, by F. C. Pratt, nine paratypes reared from *Acacia farnesiana* collected by H. S. Barber, and three paratypes under Hunter No. 1494, reared May 18, 1908, from dead branches of Huisache (*Acacia farnesiana* (Linnaeus) Willdenow) collected March 19, 1908.

This species is closely allied to *abductus* Horn, but differs from it in having the pronotum finely, transversely rugose on the disk, and the sides parallel or obliquely narrowed from the apical angles to behind the middle, then more strongly narrowed to the base, and the epistoma deeply and arcuately emarginate in front, whereas in *abductus* the pronotum is coarsely, transversely rugose, the sides are arcuately rounded near the middle, and the epistoma is only feebly emarginate in front. The male genitalia are also quite distinct in the two species.

98. AGRILUS ABDUCTUS Horn

Figure 74

Agrilus abductus Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 325–326.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67.—Fall, Calif. Acad. Sci., Occasional Papers, no. 8, 1901, p. 241.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 222.—Chamberlin, Cat. Buprestidae, 1926, p. 46.

Female.—Form moderately elongate, rather strongly flattened above, and feebly shining; head brownish cupreous, with a vague aeneous tinge; pronotum and elytra piceous, with a cupreous or aeneous reflection, and the elytra ornamented with more or less distinct pubescent spots; beneath brownish cupreous, and more shining than above.

Head with the front rather wide, moderately convex, wider at bottom than at top, the lateral margins vaguely expanded at middle, and with a narrow, vague, longitudinal groove extending from occiput to middle of front; surface sparsely, coarsely punctate, coarsely, irregularly rugose, the rugae becoming longitudinal on the occiput, and sparsely clothed with short, recumbent, silvery white pubescence; epistoma transverse between the antennae, and broadly but not deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints slightly wider than long; eyes large, broadly oval, and slightly more acutely rounded beneath than above.

Pronotum one-fourth wider than long, slightly narrower at base than apex, and widest at middle, sides arcuately rounded from apical angles to behind middle, then more strongly narrowed to near the posterior angles, where they are more or less sinuate, and the angles rectangular; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina feebly sinuate, the two carinae widely separated anteriorly, and connected to each other near the base; anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base slightly emarginate at middle of each elytron, the median lobe feebly, broadly rounded, and broadly emarginate in front of scutellum; disk moderately convex, with a broad, moderately deep median depression extending from base to near anterior margin, a broad, deep, oblique depression on each side along lateral margin, and with sharply defined, arcuate prehumeral carinae extending from base to near middle; surface obsoletely granulose, coarsely, strongly, transversely rugose, sparsely, finely punctate between the rugae, and sparsely clothed with short, inconspicuous, white hairs toward the sides. Scutellum strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra wider than pronotum at base, and about equal in width at base and near apical third; sides nearly parallel for a short distance behind base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and strongly serrulate; sides of abdomen broadly exposed above; disk slightly longitudinally concave along the sutural margins, which are strongly elevated from basal fourth to apex, a broad vague costa at outer margin of concavity, and with broad, deep basal depressions; surface coarsely, densely imbricate-punctate, and each elytron ornamented with white pubescent spots as follows: A round spot in basal depression, an elongate spot in front of middle, a small round spot at apical third, and the spots more or less connected laterally by irregularly distributed, short, white hairs.

Abdomen beneath obsoletely granulose, sparsely, finely punctate, the punctures connected transversely by more or less distinct sinuate lines, which are coarser on the basal segments, and sparsely, uniformly clothed with moderately long, recumbent, whitish hairs; first segment convex at middle; last segment broadly rounded at apex; vertical portions of segments rather densely pubescent; pygidium sparsely punctate, but not distinctly carinate. Prosternum finely, sparsely punctate, and sparsely clothed with short, recumbent, white hairs; prosternal lobe broad, moderately declivous, and broadly rounded in front; prosternal process broad, the sides strongly expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, straight, and unarmed at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Length, 5.38 mm.; width, 1.5 mm.

Male.—Differs from the female in having the head opaque, dark bronzy brown, with a feeble cupreous tinge, front narrower and less convex, the lateral margins broadly, strongly constricted near middle, and the pubescence longer; first abdominal segment rather broadly, feebly, longitudinally concave at middle, but without long, erect hairs; prosternum clothed with long, semierect, white hairs at middle; anterior and middle tibiae armed with a short tooth on inner margin at apex; and the tarsal claws dissimilar, anterior and middle claws cleft near the tip, and the teeth nearly equal in length, posterior claws cleft near middle, the inner tooth broad, shorter than outer one, and not turned inward.

Redescribed from the female lectotype No. 3491 in the Philadelphia Academy of Natural Sciences.

Type locality.—Texas (no definite locality given).

DISTRIBUTION

Material examined:

ALABAMA: Hazen, April 4, 1923 (L. B. Woodruff).
GEORGIA: Macon, April 22, 1903 (W. F. Fiske).
TEXAS: Sabinal, April, 1910 (F. C. Pratt). Fedor, Lee County, May (——).
It has also been recorded from Arizona and New Mexico, but no examples were seen from these States.

Variations.—This species varies in color from bronzy brown to brownish black, and in some examples the median depression on the pronotum is feebly interrupted at the middle. The pubescence on the elytra usually forms designs similar to *lecontei*, but frequently it is partially lost by abrasion, in which case the specimen could easily be mistaken for one of the species having spots on the elytra. Length 4 to 5.5 millimeters.

Host.—The larval habits are unknown, but Chittenden (1900) records it as having been observed by H. G. Hubbard and E. A. Schwarz on Arizona white oak (*Quercus arizonica* Sargent).

This species is closely allied to *lecontei* Saunders, and *quercus* Schaeffer. From the former it can be easily distinguished by having the prosternal lobe broadly rounded in front, whereas in *lecontei* it is deeply, arcuately emarginate. From *quercus* it can be separated by the prosternal process being expanded behind the coxal cavities, whereas in *quercus* the sides are parallel to each other to behind the coxal cavities. The male genitalia are also different in these three species.

99. AGRILUS PSEUDOFALLAX Frost

Figure 75

Agrilus pseudofallax Frost, Canad. Ent., vol. 55, 1923, pp. 279–280.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 51, pl. 1, fig. 15.—Chamberlin, Cat. Buprestidae, 1926, p. 79.

Agrilus addendus Blatchley (not Crotch), Coleoptera of Indiana, 1910, p. 804.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 223.—Chamberlin, Cat. Buprestidae, 1926, p. 48 (part). (These records probably refer to *pseudofallax* or *egeniformis*).

Agrilus impexus Stromberg (not Horn), Canad. Ent., vol. 26, 1894, pp. 36–37.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 223.—Chamberlin, Cat. Buprestidae, 1926, p. 66 (part). (These records probably refer to *pseudofallax* or *egeniformis*).

Male.—Form resembling *fallax*, but more robust, slightly flattened above, and feebly shining; head bronzy green in front, becoming brownish cupreous on the occiput; pronotum and elytra dark brown, with a distinct aeneous or cupreous tinge, and each elytron ornamented with three pubescent spots; beneath brownish cupreous, and more shining than above.

Head with the front rather wide, nearly flat, slightly wider at bottom than at top, the lateral margins obliquely expanded at bottom, and feebly, arcuately expanded near middle, and with the median groove only vaguely indicated on the occiput; surface finely, densely granulose, sparsely, coarsely punctate, transversely rugose behind epistoma, longitudinally rugose on occiput, and sparsely clothed with short, semierect, silvery white hairs on the front; epistoma scarcely transverse between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending beyond middle of pronotum, serrate from the fifth joint, and the outer joints as wide as long; eyes large, elongate, and more acutely rounded beneath than above.

Pronotum about one-fourth wider than long, about equal in width at base and apex, and widest near middle; sides slightly arcuately rounded from apical angles to behind middle, then more strongly narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are strongly sinuate, narrowly separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base feebly emarginate at middle of each elytron, the median lobe strongly, broadly rounded, and distinctly emarginate in front of scutellum; disk moderately convex, with a broad, elongate median depression, more or less interrupted at middle, and slightly deeper posteriorly, a broad, deep, oblique depression on each side along the lateral margin, which is slightly flattened, and with straight, vague, obtuse prehumeral carinae; surface vaguely granulose, strongly, transversely rugose, sparsely, finely punctate between the rugae, and sparsely clothed with yellowish pubescence in the lateral depressions. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and feebly serrulate; sides of abdomen narrowly exposed above; disk feebly, longitudinally concave along the sutural margins, sutural margins strongly elevated from basal third to apex, and with broad, shallow basal depressions; surface coarsely, densely imbricate-punctate, and each elytron ornamented with three round, yellowish pubescent spots, one in basal depression, one in front of middle, and the other at apical third.

Abdomen beneath obsoletely reticulate, finely, sparsely punctate, the punctures connected transversely by more or less distinct sinuate lines, which are coarser on the basal segments and sparsely, uniformly clothed with rather short, recumbent, whitish hairs; first segment flattened or slightly concave at middle; last segment broadly rounded at apex, vertical portions of the segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, but not distintctly carinate. Prosternum finely, sparsely punctate, and rather densely clothed with long, erect, fine, whitish hairs, which extend along the middle of body to behind the middle of second abdominal segment; prosternal lobe broad, feebly declivous, and broadly but not deeply emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a short tooth on the inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than the outer one, and not turned inward.

Length, 5.75 mm.; width, 1.5 mm.

Female.—Differs from the male in having the head uniformly mahogany red, lateral margins obliquely narrowed from bottom to top, surface not so distinctly granulose, and the pubescence sparser; first abdominal segment convex at middle; prosternum without long, erect pubescence, and the tibiae unarmed.

Redescribed from the male type in the collection of C. A. Frost.

Type locality.—Allegheny County, Pa.

DISTRIBUTION

Material examined:

ALABAMA: Hazen, April 4, 1921 (L. B. Woodruff).
INDIANA: No definite locality.
IOWA: Fort Madison (——).
KANSAS: Benedict County (W. Knaus).
LOUISIANA: Tallulah, April 13, 1910 (——). Opelousas, May 7, 1908 (R. A. Cushman).
MISSISSIPPI: Agricultural College, March 23, 1920 (M. W. Blackman).
OHIO: Maumee, June 7 (A. Mathewson); Cincinnati (——).
PENNSYLVANIA: Jeannette, June–July; Pittsburgh, June 3 (H. G. Klages).

Variations.—The color is rather constant, although some examples have a slightly more cupreous or greenish tinge than others, and the median depressions on the pronotum and the prehumeral carinae are more or less variable. Length 4.5 to 6.25 millimeters.

Host.—This species has never been reared, therefore the larval habits are unknown, but the adults have been collected by Woodruff in Alabama on oak (*Quercus* sp.).

Superficially this species resembles very closely *fallax* Say, and the two species are probably confused in most collections, but it can be readily separated from *fallax* by having the antennae serrate from the fifth joint.

100. AGRILUS EGENIFORMIS Champlain and Knull

Figure 76

Agrilus egeniformis CHAMPLAIN and KNULL, Ent. News, vol. 34, 1923, pp. 84–85, fig. 3.—KNULL, Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 51–52, pl. 1, figs. 5, 18.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 59.

Agrilus addendus Blatchley (not Crotch), Coleoptera of Indiana, 1910, p. 804.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 223.—Chamberlin, Cat. Buprestidae, 1926, p. 48 (part). (These records probably refer to *pseudofallax* or *egeniformis*).

Agrilus impexus Stromberg (not Horn), Canad. Ent., vol. 26, 1894, pp. 36–37.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 223.—Chamberlin, Cat. Buprestidae, 1926, p. 66 (part). (These records probably ably refer to *pseudofallaw* or *egeniformis.*)

Male.—Form resembling *egenus* Gory, slightly flattened above, and strongly shining; head green, with a distinct aeneo-cupreous tinge; pronotum and elytra bronzy green to olivaceous green, and each elytron ornamented with three more or less distinct pubescent spots; beneath bronzy green, with a slight cupreous tinge, and more shining than above.

Head with the front rather wide, feebly convex, about equal in width at top and bottom, the lateral margins nearly parallel, vaguely constricted near bottom, and with a broad, vague, median depression on vertex; surface densely, finely granulose, feebly, sparsely punctate, transversely rugose behind epistoma, longitudinally rugose on occiput, and sparsely clothed with short, recumbent, silvery white hairs behind the epistoma; epistoma slightly transverse between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending to posterior angles of pronotum, serrate from the fifth joint, and the outer joints distinctly longer than wide; eyes large, broadly elongate, and slightly more acutely rounded beneath than above.

Pronotum about one-third wider than long, nearly equal in width at base and apex, and widest along apical half; sides nearly parallel or vaguely, arcuately rounded from apical angles to behind middle, then more strongly narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are slightly sinuate, narrowly separated anteriorly, and connected to each other behind the middle, anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base transversely bisinuate, with the median lobe feebly produced, and subtruncate in front of scutellum; disk moderately convex, with two feeble, median depressions, a broad, shallow, oblique depression on each side along lateral margin, and with sharply defined, straight, prehumeral carinae, extending from posterior angles to near middle; surface finely granulose, coarsely, transversely rugose, and sparsely, finely punctate between the rugae. Scutellum strongly, transversely carinate, and the surface finely densely reticulate.

Elytra slightly wider than pronotum at base, and equal in width at base and behind middle; sides nearly parallel for a short distance behind base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips which are separately, narrowly rounded, and rather coarsely serrulate; sides of abdomen narrowly exposed above; disk feebly, longitudinally depressed along sutural margins at middle, sutural margins rather strongly elevated from basal third to apex, and with broad, shallow basal depressions; surface coarsely, densely imbricate-punctate, sparsely clothed with short, inconspicuous hairs posteriorly, and each elytron ornamented with three whitish pubescent spots, one in basal depression, one in front of middle, and the other at apical third.

Abdomen beneath obsoletely reticulate, finely, sparsely punctate, the punctates connected transversely by more or less distinct sinuate or crenulate lines, which are coarser on the basal segments, and sparsely clothed with short, recumbent, white hairs; first and second segments broadly, longitudinally concave at middle; last segment broadly rounded or subtruncate at apex, with a few coarse granules near the posterior margin; vertical portions of segments slightly more pubescent than ventral surface; pygidium vaguely punctate, and feebly carinate, but the carina not projecting. Prosternum sparsely, coarsely punctate, more or less rugose, and rather densely clothed at middle with long, erect, fine, whitish hairs, which extend along the middle of body to the posterior margin of second abdominal segment; prosternal lobe broad, slightly declivous, and feebly, broadly emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Tibiae slender, the anterior and middle pairs slightly arcuate, and armed with a distinct tooth on inner margin at apex. Posterior tarsi about as long as the tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Length, 4.75 mm.; width, 1.2 mm.

Female.—Differs from the male in having the head slightly more bronzy green, and the surface more strongly rugose; antennae not extending to posterior angles of pronotum; first and second abdominal segments not depressed or densely pubescent at middle; prosternum without long, erect pubescence; posterior tarsi not as long as tibiae, and the tibiae unarmed at the apex.

Redescribed from the male type in the collection of J. N. Knull.

Type locality.—" C. Missouri."

DISTRIBUTION

Material examined:

IOWA: Ames, July 4 (F. M. Hull).

KANSAS: Douglas County, May 21, 1923 (P. B. Lawson, F. H. Snow). Wyandotte County, June 23, 1924; Leavenworth County, June 28, 1924 (R. H. Beamer).

MISSOURI: No definite locality.
NEBRASKA: West Point, June, 1888 (L. C. Bruner).
OHIO: Columbus, June, July (J. N. Knull).
OKLAHOMA: Lawton, June 10, 1917 (G. W. Barber).
PENNSYLVANIA: Jeannette, July 1 (H. G. Klages).
SOUTH CAROLINA: Clemson College, June 29, 1926 (J. O. Pepper).

Variations.—The color varies from bronzy green to brownish cupreous, the pubescent spots are more or less abraded in some examples, and occasionally these spots are obsolete. Length 3.75 to 4.75 millimeters.

Host.—Nothing is known of the larval habits of the species, but the adults have been collected by Bruner in Nebraska on honey locust (*Gleditsia triacanthos* Linnaeus).

This species is very closely allied to *pseudofallax* Frost, but the pubescent spots on the elytra are not very distinct and the median ones are elongate, the median depression on the pronotum is obsolete, the front of the head in the female is bronzy green, and the sides of the male genitalia are strongly, arcuately expanded near the apex, whereas in *pseudofallax* the pubescent spots on the elytra are distinct and the median ones rounded, the median depression on pronotum is distinct, the front of the head in the female is mahogany red, and the sides of the male genitalia are nearly parallel to each other.

101. AGRILUS DOLLI Schaeffer

Figure 77

Agrilus dollii SCHAEFFER, Journ. N. Y. Ent. Soc., vol. 12, 1904, pp. 210–211.—FROST and WEISS, Canad. Ent., vol. 53, 1921, p. 72.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 59.

Male.—Form similar to *lecontei;* head dark bronzy green, becoming brownish cupreous on occiput, and strongly shining; pronotum and elytra dark bronzy brown or piceous, more or less cupreous, with a vague, bluish black facia behind middle, and the elytra ornamented with pubescent designs; beneath brownish or reddish cupreous, with a feeble greenish reflection.

Head with the front rather wide, slightly convex, about equal in width at bottom and top, the lateral margins nearly parallel, and with a feeble, broad, longitudinal depression extending from occiput to epistoma, in front of which it is more broadly depressed; surface sparsely, coarsely punctate, coarsely, irregularly rugose, the rugae becoming somewhat longitudinal on the occiput, and clothed with a few short, inconspicuous hairs; epistoma strongly transverse between the antennae, and broadly, deeply, arcuately emarginate in front; antennae scarcely extending to middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes moderately large, rather broadly oval, and equally rounded above and beneath.

Pronotum one-third wider than long, about equal in width at base and apex, and widest at middle; sides slightly arcuately rounded from apical angles to base; when viewed from the side the marginal carina is strongly sinuate and strongly deflexed anteriorly, the submarginal carina nearly straight, the two carinae widely separated anteriorly, and connected to each other near the middle; anterior margin moderately sinuate, and the median lobe broadly rounded; base slightly emarginate at middle of each elytron, the median lobe feebly, broadly rounded, and truncate in front of scutellum; disk moderately convex, with two broad, deep median depressions, connected by a narrow groove, a broad, oblique depression on each side along lateral margin, and with sharply defined, long prehumeral carinae; surface vaguely granulose, feebly but not closely rugose, sparsely, finely punctate, and sparsely clothed with short, recumbent, whitish hairs. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and feebly wider at base than behind middle; sides slightly rounded for a short distance behind base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are strongly emarginate and serrulate; sides of abdomen narrowly exposed above; disk feebly longitundinally depressed along sutural margins, with feeble indications of a costa on each side, sutural margins slightly elevated posteriorly, and with broad, shallow basal depressions; surface feebly, coarsely imbricate-punctate, and ornamented with pubescent designs as in *lecontei.*

Abdomen beneath obsoletely granulose, sparsely, finely punctate, the punctures denser and connected transversely by fine, sinuate lines on basal segments, and sparsely clothed with short, recumbent, whitish hairs; first segment convex, without a median depression; last segment broadly rounded or subtruncate at apex; vertical portions of segments not conspicuously pubescent; pygidium rather strongly carinate, but the carina not projecting. Prosternum finely, sparsely punctate, and sparsely clothed with short, erect, inconspicuous hairs; prosternal lobe broad, rather strongly declivous, and broadly, deeply, arcuately emarginate in front; prosternal process broad, the sides strongly expanded behind the coxal cavities, then transversely truncate to the apex, which is acute. Tibiae slender, anterior pair feebly arcuate, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint about as long as the following two joints united. Tarsal claws dissimilar; anterior claws cleft near the tip and the teeth nearly equal in length; middle and posterior claws cleft near the middle, the inner tooth broad, much shorter than the outer one, and not turned inward.

Length, 4.5 mm.; width, 1.25 mm.

Female.—Differs from the male in having the head uniformly dark reddish brown, sometimes with a feeble greenish reflection; prosternum without erect hairs at middle; tibiae unarmed at apex, and the tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Redescribed from the male cotype Cat. No. 254, in the Museum of the Brooklyn Institute of Arts and Sciences.

Type locality.—Esperanza Ranch, Brownsville, Tex.

DISTRIBUTION

Material examined:

TEXAS: Brownsville (Esperanza Ranch), June 14–July 1; Tolusa, May (Chas. Schaeffer). Brownsville (Los Borregos), May 22–24, 1904 (H. S. Barber).

Variations.—The specimens examined show very little variation, except in size, and occasionally the pubescent markings are more or less abraded. Length 3.75 to 5 millimeters.

Host.—Schaeffer collected the adults of this species on the branches of Texas ebony (*Acacia*) *Pithecolobium flexicaule* (Bentham) Coulter, but so far the species has not been reared.

This species resembles very closely *lecontei* Saunders, but can be readily separated from that species by having the tips of the elytra emarginate.

102. AGRILUS LECONTEI Saunders

Figure 78

Agrilus subfasciatus LECONTE, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, pp. 245–246 (name preoccupied).—CROTCH, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 93.

Agrilus lecontei SAUNDERS, Cat. Buprestidarum. 1871, p. 117, no. 110 (new name for *subfasciatus*).—LUGGER, Psyche, vol. 4, 1884, p. 203.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 324–325, pl. 8, figs. 5, 17.—STROMBERG, Canad. Ent., vol. 26, 1894, p. 36.—HAMILTON, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364.—SMITH, 27th Ann. Rept. N. J. State Board Agric. for 1899 (1900), suppl. p. 258.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—ULKE, Proc. U. S. Nat. Mus., vol. 25, no. 1275, 1902, p. 21.—SCHAEFFER, Journ. N. Y. Ent. Soc., vol. 12, 1904, p. 211.—FELT, N. Y. State Mus., Mem. 8, vol. 2, 1906, p. 736.—BLATCHLEY, Coleoptera of Indiana, 1910, p. 804, figs. 307*a–b*, 311*c*.—SMITH, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295.—KNULL, Ent. News, vol. 31, 1920, p. 11.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 222.—BÖVING and CHAMPLAIN, Proc. U. S. Nat. Mus., vol. 57, 1920, p. 636.—KNULL, Canad. Ent., vol. 54, 1922, p. 86.—

Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 9, pl. 1, figs. 3, 5.—Blackman and Stage, N. Y. State College Forestry, Tech. Pub. 17, pt. 1, 1924, p. 66.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 51, pl. 1, figs. 31–32.—Chamberlin, Cat. Buprestidae, 1926, pp. 68–69.

Male.—Form moderately elongate, slightly flattened above, and rather strongly shining; head light green in front, and becoming brownish cupreous on the occiput; pronotum and elytra dark bronzy brown, with a more or less distinct cupreous tinge, and the elytra ornamented with pubescent designs; beneath brownish cupreous, the legs slightly greenish, and scarcely more shining than above.

Head with the front rather wide, feebly convex, slightly wider at bottom than at top, the lateral margins feebly narrowed from bottom to top, and with a feeble, broad, longitudinal depression extending from occiput to epistoma, the depression broader behind the epistoma; surface sparsely, coarsely punctate, coarsely rugose, the rugae irregular on the front but becoming longitudinal on the occiput, and sparsely clothed with long, recumbent, whitish hairs; epistoma strongly transverse between the antennae, and broadly but not very deeply, arcuately emarginate in front; antennae extending beyond middle of pronotum, serrate from the fifth joint, and the outer joints about as long as wide; eyes moderately large, elongate, and more acutely rounded beneath than above.

Pronotum about one-half wider than long, about equal in width at base and apex, and widest at middle; sides feebly, arcuately rounded from apical angles to behind middle, then more strongly narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal carina is slightly sinuate, the submarginal carina nearly straight, the two carinae rather widely separated anteriorly, and connected to each other near the middle; anterior margin strongly sinuate, and the median lobe broadly, strongly rounded; base slightly emarginate at middle of each elytron, the median lobe feebly rounded, and subtruncate in front of scutellum; disk moderately convex, with two broad, deep median depressions, feebly connected by a narrow groove, a broad, moderately deep, oblique depression on each side along lateral margin, and with distinct, long, prehumeral carinae; surface coarsely but not closely, transversely rugose, finely, sparsely punctate between the rugae, and sparsely clothed with short, recumbent, white hairs. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and behind the middle; sides nearly parallel for a short distance behind base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and strongly serrulate; sides of abdomen not distinctly exposed above; disk feebly, longitudinally depressed along sutural margins, with feeble indications of a costa on each side, sutural margins elevated posteriorly, and with broad, shallow basal depressions; surface feebly, coarsely imbricate-punctate, and each elytron ornamental with whitish pubescent designs as follows: A rather broad vitta, more or less interrupted, extending along suture from basal depression to middle, then obliquely backward toward lateral margin, and the apical third vaguely pubescent, inclosing a glabrous spot near the suture.

Abdomen beneath sparsely, finely punctate, the punctures denser on basal segment, connected transversely by more or less distinct sinuate lines, and uniformly, rather densely clothed with short, recumbent, whitish pubescence; first segment slightly flattened at middle, and sparsely clothed with long, erect, inconspicuous hairs; last segment broadly rounded or subtruncate at apex; vertical portions of segments not conspicuously pubescent; pygidium coarsely punctate, vaguely carinate, but the carina not projecting. Prosternum finely, densely punctate, and sparsely clothed with long, erect, inconspicuous hairs; prosternal lobe broad, rather strongly declivous, and broadly, deeply, arcuately emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Tibiae slender, the anterior and middle pairs slightly arcuate, and armed with a short tooth on inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint as long as the following three joints united. Tarsal claws dissimilar; claws on each anterior tarsus different, one claw is cleft near the tip, and the teeth nearly equal in length, the opposite claw cleft near the middle, the inner tooth broader and distinctly shorter than the outer one; middle and posterior claws cleft near middle, the inner tooth broad, shorter than outer one, and not turned inward.

Length, 5 mm.; width, 1.25 mm.

Female.—Differs from the male in having head uniformly dark brownish cupreous, the front nearly equal in width at top and bottom, lateral margins nearly parallel, and the surface coarsely rugose in front, and less pubescent; first abdominal segment convex at middle, and without long pubescence; prosternum without long, erect hairs at middle; tibiae unarmed at apex, and the tarsal claws similar to the posterior claws of male on all feet.

Redescribed from the male type of *subfasciatus* in the Museum of Comparative Zoölogy.

Type locality.—Illinois (no definite locality given).

DISTRIBUTION

Material has been examined from various localities in the following States:

> District of Columbia, Illinois, Indiana, Iowa, Kansas, Maryland, Michigan, Missouri, New Jersey, New York, Ohio, Pennsylvania, South Carolina, Virginia, West Virginia and Wisconsin. It has also been recorded in the literature from Louisiana and Mississippi, but these records may refer to the subspecies *celticola*.

Variations.—The color is quite constant, but the pubescence may be more or less abraded. The median depressions on the pronotum vary more or less in depth, but still preserve the form of two depressions united by a groove. Length 4 to 6 millimeters.

Host.—This species has been reared a number of times from dead branches of hackberry (*Celtis occidentalis* Linnaeus). Lugger (1884) records it as breeding in dogwood (*Cornus florida* Linnaeus), but this is probably an error of identification, either of the insect or the host.

This species was first described by LeConte (1859) under the name of *subfasciatus*, but since this name was preoccupied by Gory (1841) for a species of the same genus from Brazil, Saunders (1871) renamed it *lecontei*.

102a. AGRILUS LECONTEI CELTICOLA, new subspecies

This subspecies differs from the typical form in having the pubescent designs on the elytra usually more distinct, and the male with the tarsal claws similar on the anterior feet, both claws being cleft near the tip, and the two teeth about equal in length, whereas in the typical form the claws are dissimilar on the anterior feet; one claw is cleft near the tip and the teeth nearly equal in length, the opposite claw is cleft near the middle, and the inner tooth broader and distinctly shorter than the outer one. Male genitalia similar to *lecontei* Saunders.

Length, 3–6 mm.; width, 0.9–1.75 mm.

Type locality.—Brownsville, Tex.

Other localities.—Arizona: Oracle, July (Hubbard and Schwarz). Texas: Zavalla County, April (Hunter and Pratt); Sanderson, May (J. D. Mitchell); Beeville, April (E. A. Schwarz); Brownsville, March–June (Jones and Pratt, E. A. Schwarz, H. S. Barber, and McMillan); San Diego, April–May (E. A. Schwarz, C. H. T. Townsend); Victoria, March (J. D. Mitchell, E. A. Schwarz); Sabinal, May (F. C. Pratt); Dallas, March–May (Cushman, Pratt, Pierce); Columbus, May–June (E. A. Schwarz); San Antonio, June (——); Devil's River, May (Bishopp and Pratt); Sheffield, April (J. O. Martin); Kerrville, April–June (F. C. Pratt); Cypress Mills (——); Edinburg (——).

Type, allotype, and paratypes.—Cat. No. 41012, U.S.N.M. Paratypes in the California Academy of Sciences.

Described from a large series of specimens (one type). This subspecies has been reared from sugarberry (*Celtis laevigata* Willdenow), and from the material examined, seems to be confined to the southwestern part of the country. The larval habits and male genitalia are similar to those of the typical form, but since the males can be readily separated by the tarsal claws on the anterior feet, it seems advisable to consider it as a valid subspecies.

103. AGRILUS ABJECTUS Horn

Figure 79

Agrilus abjectus Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 321–322.—Chamberlin, Cat. Buprestidae, 1926, p. 47.

Male.—Form rather robust, subcylindrical, slightly flattened above, and feebly shining; head bronzy green in front, becoming brownish cupreous on the occiput; pronotum and elytra brownish black, with a more or less distinct aeneous or cupreous tinge, and the elytra ornamented with three more or less distinct pubescent spots; beneath brownish black, with a cupreous or aeneous reflection, and more shining than above.

Head with the front rather wide, feebly convex, and slightly wider at top than at bottom, the lateral margins feebly expanded from bottom to top, and with a broad, shallow depression extending from occiput to epistoma; surface sparsely, coarsely punctate, coarsely, irregularly (more or less obliquely posteriorly) rugose, and sparsely clothed with semierect, inconspicuous pubescence; epistoma narrow between the antennae, and feebly, broadly, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes large, broadly oval, and slightly more acutely rounded beneath than above.

Pronotum as long as wide, slightly narrower at base than apex, and widest at apical third; sides feebly, arcuately rounded from apical angles to middle, then more strongly narrowed to near base where they are feebly sinuate, and the posterior angles rectangular; when viewed from the side the marginal carina is moderately sinuate, submarginal carina nearly straight, the two carinae rather widely separated anteriorly, and connected to each other at base; anterior margin strongly sinuate, and the median lobe strongly, broadly rounded; base feebly, broadly emarginate at middle of each elytron, the median lobe feebly, broadly rounded, and subtruncate in front of scutellum; disk strongly convex anteriorly, with an obsolete, linear median depression, lateral depressions scarcely indicated, sides not explanate, and without distinct prehumeral carinae; surface densely, coarsely, very irregularly rugose, finely, sparsely punctate between the rugae, and without distinct pubescence. Scutellum feebly, transversely carinate, and the surface finely, densely reticulate.

Elytra distinctly wider than pronotum at base, and about equal in width at base and behind middle; sides feebly rounded for a short distance behind the base, feebly, broadly constricted near middle, broadly arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and feebly serrulate; sides of abdomen broadly exposed above; disk feebly depressed, sutural margins slightly elevated posteriorly, and with broad, shallow basal depressions; surface densely, coarsely imbricate-punctate, sparsely uniformly clothed with short, recumbent, white hairs, and each elytron ornamented with more or less distinct pubescent spots as follows: One in basal depression, one in front of middle, and the other at apical third.

Abdomen beneath rather densely, finely punctate, the punctures connected transversely by fine, sinuate lines, which are coarser on basal segment, and sparsely clothed with recumbent, whitish pubescence, which is slightly longer at middle of basal segment; first segment feebly convex at middle, last segment broadly rounded at apex; vertical portions of first segment rather densely pubescent; pygidium coarsely punctate, feebly, longitudinally carinate, but the carina not projecting. Prosternum densely punctate, somewhat rugose, and sparsely clothed with long, erect, inconspicuous hairs; prosternal lobe broad, strongly declivous, and broadly, rather deeply, arcuately emarginate in front; prosternal process broad, the sides expanded behind the coxal cavities, and truncate at apex (visible part). Tibiae slender, anterior pair slightly arcuate, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Length, 6.75 mm.; width, 1.75.

Female.—Differs from the male in having the head more cupreous in front; first two abdominal segments more finely punctured and less pubescent; prosternum more sparsely punctured and the pubescence at middle shorter, and the tibiae unarmed at apex.

Redescribed from the male and female cotypes, Cat. No. 6608 in the United States National Museum.

Type locality.—Texas (definite locality unknown).

DISTRIBUTION

Material examined:

TEXAS: Victoria, April 18–May 3 (J. D. Mitchell). Kerrville, May 30–June 2 (F. C. Pratt). Chamberlin (1926) records it also from Davis and Flotonia, Tex., and from Onaga, Kans.; the latter record is probably from an incorrectly identified specimen, and probably should be *impexus* Horn.

Variations.—The color varies from bronzy brown to cupreous brown, and the length from 6 to 7.5 millimeters. In some examples the pubescent spots on the elytra are scarcely visible, whereas in others they are rather distinct.

Host.—Unknown.

This species seems to be rare in collections and very few examples have been examined. Horn described the species from five examples, all of which are from the Belfrage collection, and without definite locality labels. The lectotype No. 3489 in the collection of the Philadelphia Academy of Natural Sciences is a female. The four other examples mentioned by Horn in his description as being in the National Museum are badly confused, and represent three different species, two of which are *abjectus* Horn (male and female), one is *impexus* Horn, and the other one is *addendus* Crotch.

The species is not conspicuously marked, but among those in which the antennae are serrate from the fifth joint it may be known by the very convex pronotum, with a feeble median depression, absence of prehumeral carinae, the feeble pubescent spots on the elytra, and the sides of the prosternal process expanded behind the coxal cavities.

104. AGRILUS BLANDUS Horn

Figure 80

Agrilus blandus HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 321.—FALL, Calif. Acad. Sci., Occasional Papers, no. 8, 1901, pp. 120–121.—WICKHAM, Canad. Ent., vol. 35, 1903, p. 71.—WOODWORTH, Guide to California Insects, 1913, p. 195.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 55.

Male.—Form moderately robust, subcylindrical, vaguely flattened above, and feebly shining; head cupreous, with a more or less aeneous tinge; pronotum dark brownish cupreous; elytra reddish cupreous, and ornamented with whitish pubescent vittae; beneath cupreous, with an aeneous tinge, and more shining than above.

Head with the front rather wide, feebly convex, and slightly wider at top than at bottom, the lateral margins feebly expanded from bottom to top, and with a rather broad, shallow, longitudinal depression extending from occiput to epistoma, behind which the surface is transversely depressed; surface obsoletely granulose, rather densely, coarsely punctate, coarsely, irregularly rugose, and sparsely clothed with long, recumbent, whitish pubescence; epistoma transverse between the antennae, slightly elevated, and broadly but not deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints slightly longer than wide; eyes large, elongate, and slightly more acutely rounded beneath than above.

Pronotum slightly wider than long, feebly narrower at base than apex, and widest near middle; sides slightly arcuately rounded from apical angles to behind middle, then more strongly narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are slightly sinuate, rather widely separated anteriorly, and connected to each other at base; anterior margin rather strongly sinuate, and the median lobe strongly, broadly rounded; base feebly, broadly emarginate at middle of each elytron, and the median lobe broadly rounded; disk strongly convex, with broad, feeble lateral depressions, but without any trace of median depressions or prehumeral carinae; surface obsoletely granulose, densely, feebly rugose, the rugae more or less oblique at middle, but becoming more irregular toward the sides, finely, densely punctate between the rugae, and rather densely clothed with long, recumbent, whitish hairs at the sides posteriorly. Scutellum vaguely, transversely carinate, the carinae strongly sinuate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and slightly wider at base than behind middle; sides feebly rounded for a short distance behind base, feebly, arcuately constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and coarsely serrulate; sides of abdomen broadly exposed above, disk convex, sutural margins strongly elevated posteriorly, and with broad, shallow basal depressions; surface densely, coarsely imbricate-punctate, and each elytron ornamented with pubescent spaces composed of densely placed, rather long, recumbent, whitish hairs as follows: a round spot in basal depression, and a narrow vitta extending along sutural margin from basal fourth to apex.

Abdomen beneath rather densely, finely punctate, the punctures connected transversely by fine sinuate lines which are coarser on the first two basal segments, and clothed with long, recumbent whitish pubescence, which is denser at the sides; first two segments feebly convex at middle; last segment broadly rounded at apex; vertical portions of the first segment densely pubescent; pygidium coarsely punctate, longitudinally carinate, but the carina not projecting. Prosternum sparsely, coarsely punctate, and sparsely clothed with long, erect, white hairs, which extend along middle of body to second abdominal segment; posternal lobe broad, strongly declivous, and broadly truncate or vaguely emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then strongly narrowed to the apex, which is acute. Tibiae slender, the anterior and middle pairs slightly arcuate, and armed with a short tooth on innner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward. Length, 6.75 mm.; width, 1.75 mm.

Female.—Differs from the male in having the front of head uniformly reddish cupreous; first two abdominal segments more finely punctured; long, erect pubescence on prosternum and median part of body not quite so distinct and the tibiae all unarmed at apex.

Redescribed from the male lectotype No. 3488 (except the posterior claws, which are missing on the lectotype) in the Philadelphia Academy of Natural Sciences.

Type locality.—Tehachapi, Calif.

DISTRIBUTION

Material examined:

California: Los Angeles County, July (D. W. Coquillett). San Jacinto Mountains, July 14, 1912 (P. H. Timberlake). Azusa, Los Angeles County, July 25, 1906 (——). San Diego, Inyo Mountains, July 7–11, 7,000–9,000 feet, and Tehachapi (H. F. Wickham). Pasadena, June–July (H. C. Fall). Chamberlin (1926) records it from Utah and Arizona, but no specimens have been examined from these States.

Variations.—The coloration is rather constant, except that in a few examples the pronotum is more brownish than the elytra. The pubescence on the sides of the pronotum is sometimes more or less lost by abrasion, and frequently there is a dense white efflorescence between the hairs, causing the areas to be very conspicuous. Length 6 to 7.5 millimeters.

Host.—Unknown.

This species is also rare in collections, and resembles somewhat the examples of *abjectus* which have the elytral pubescent spots distinct. It can, however, be readily separated from that species by having the pronotum regularly convex and without a median depression and the median and posterior pubescent spots on the elytra connected to each other and forming a distinct vitta.

105. AGRILUS SUBCINCTUS Gory

Figure 81

Agrilus subcinctus Dejean, Cat. Coleopt., ed. 2, 1833, p. 82; ed. 3, 1837, p. 93 (no description).—Gory, Mon. Bupr. Suppl., vol. 4, 1841, pp. 252–253, pl. 42, fig. 245.—LeConte, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9; Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 246.—Pettit, Canad. Ent., vol. 2, 1870, p. 102.—Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 93.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 322–323.—Hamilton, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364.—Smith, 27th Ann. Rept. N. J. State Board Agric. for 1899 (1900), suppl., p. 258.—Ulke, Proc. U. S. Nat. Mus., vol. 25, no. 1275, 1902, p. 21.—Smith, Ann. Rept. N. J. State. Mus. for 1909 (1910), p. 295.—Blatchley, Coleoptera of Indiana, 1910, p. 803.—Dozier, Ent. News, vol. 29, 1918, p. 331.—Knull, Ent. News, vol. 31, 1920, p. 11.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 222.—Knull, Canad. Ent., vol. 54, 1922, p. 85.—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 12.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 50.—Chamberlin, Cat. Buprestidae, 1926, p. 83.

Male.—Form small, rather robust, strongly flattened above, and rather strongly shining; head bright bronzy green in front, becoming brownish cupreous on the occiput; pronotum and elytra piceous, with a strong aeneous or cupreous tinge, and the latter sometimes feebly violaceous posteriorly, and ornamented with pubescent designs; beneath similar to above, but slightly more shining.

Head with the front rather narrow, slightly convex, and wider at top than at bottom, the lateral margins feebly, broadly, arcuately constricted, and with a rather narrow, longitudinal depression extending from occiput to epistoma, the groove more deeply depressed on the front, and becoming triangular behind the epistoma surface obsoletely granulose, sparsely, coarsely punctate, coarsely, irregularly rugose, and sparsely clothed anteriorly with moderately long, recumbent white pubescence; epistoma scarcely transverse between the antennae, strongly elevated, and vaguely, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes moderately large, broadly oval, and equally rounded above and beneath.

Pronotum wider than long, about equal in width at base and apex, and widest near middle; sides nearly parallel or arcuately rounded from apical angles to basal third, then narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are nearly straight or feebly sinuate, rather widely separated anteriorly, and connected to each other at base; anterior margin feebly sinuate, and the median lobe feebly, broadly rounded; base feebly, broadly emarginate at middle of each elytron, and the median lobe broadly, vaguely rounded; disk moderately convex, with two broad, moderately deep, median depressions, the lateral depressions broad, deep, and extending to base, sides explanate posteriorly, and without any trace of prehumeral carinae; surface obsoletely granulose, coarsely but not deeply rugose, the rugae more or less transverse at middle, and becoming irregular toward the sides, sparsely, finely punctate between the rugae, and sparsely clothed with long, recumbent white hairs in the median and lateral depressions. Scutellum transversely carinate, and the surface finely, densely reticulate.

Elytra wider than pronotum at base, and equal in width at base and behind middle; sides nearly parallel for a short distance behind base, feebly, broadly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and finely serrulate; sides of abdomen scarcely exposed above; disk slightly flattened, sutural margins rather strongly elevated posteriorly, and with broad, shallow basal depressions; surface obsoletely granulose, rather densely, finely punctate, more or less transversely, irregularly rugose, and each elytron ornamented with whitish pubescent markings as follows: A vitta extending along the sutural margin from basal depression to middle (sometimes more or less interrupted), then turning obliquely outward toward the lateral margin, and a broad, oblique fascia at apical fourth.

Abdomen beneath finely, densely reticulate, finely, sparsely punctate, the punctures connected transversely by fine, sinuate lines, which are coarser on the basal segment, and sparsely clothed with short, recumbent, white hairs; first segment feebly flattened at middle, and clothed with a few longer, erect hairs; last segment broadly rounded at apex; vertical portions of first segment sometimes more densely pubescent than ventral surface; pygidium vaguely punctured but not carinate. Prosternum finely punctate, densely granulose, and sparsely clothed with long, semierect, white hairs; prosternal lobe broad, strongly declivous, and broadly but not very deeply arcuately emarginate in front; prosternal process broad, the sides parallel to behind the coxal cavities, then strongly narrowed to the apex, which is acute. Tibiae slender, and the anterior and middle pairs armed with a feeble tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Female.—Differs from the male in having the front of head entirely brownish cupreous and the lateral margins obliquely expanded from bottom to top; sides of abdomen narrowly exposed above; first abdominal segment more finely punctured and less densely pubescent at middle, and the tibiae unarmed at apex.

Length, 3.5–4.5 mm.; width, 0.8–1.25 mm.

Type locality.—North America. Originally described from the Dejean Collection, but present location of type is unknown to writer.

DISTRIBUTION

Material examined:

CANADA: Grimsly, Ontario (Pettit).
DISTRICT OF COLUMBIA: Washington (H. Ulke).
FLORIDA: Gainesville (H. L. Dozier).
ILLINOIS: Meredesia, May 28, 1917 (——). St. Clair County, June (——).
LOUISIANA: Shreveport, April 7, 1909 (W. D. Pierce).
MISSOURI: St. Charles, May 18 (——).
NEW JERSEY: Westville (Liebeck). Orange Mts., July 28 (A. S. Nicolay). South Jersey (Wenzel).
NEW MEXICO: Cloudcroft, 9,000 feet (W. Knaus).
NEW YORK: Olcott, July 11, 1926 (H. Dietrich).
NORTH CAROLINA: No definite locality.
OHIO: No definite locality.
OKLAHOMA: Payne County, May 18, 1926 (W. J. Brown).
PENNSYLVANIA: Jeannette; Pittsburgh, June 18 (H. G. Klages). Castle Rock, June 13 (H. W. Wenzel). Abington (——). Inglenook, July 8; Hummelstown, June 2; Chambersburg, June 12 (J. N. Knull).
TEXAS: Dallas, April 30, 1912 (——). Jefferson, March 27, 1908 (E. S. Tucker).

It has also been recorded from various localities in Indiana.

Variations.—This species is rather constant in size and coloration but quite variable in some of the other characters. Some examples are considerably more robust than others, the pronotum is from one-third to one-half wider than long, the sides are either nearly parallel to each other from the apical angles to basal third or regularly, strongly rounded, and the median depressions are more or less variable in depth. The pubescent design on the elytra may consist of an arcuate vitta extending from the basal depression to middle, and a broad, oblique fascia at apical fourth, or the vitta may be interrupted so as to form three or four small spots.

Host.—The larval habits are unknown, but the adults have been collected by H. A. Wenzel on the foliage of poison ivy (*Toxicodendron radicans* (Linnaeus) Kuntze), and the numbers taken indicate that poison ivy is probably the host plant.

106. AGRILUS MUTICUS LeConte

Figure 82

Agrilus muticus LECONTE, Proc. Acad. Nat. Sci. Phila., vol. 10, 1858, p. 70; Journ. Acad. Nat. Sci. Phila., vol. 4, ser. 2, 1858, p. 35; Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 248.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 314.—TUCKER, Ent. News, vol. 17, 1906, p. 11.—CHAMBERLIN, Cat. Buprestidae, 1926, p. 70.

Female.—Form rather robust, slightly flattened above, subopaque, plumbeus, and with a bluish tinge; beneath similar to above but more shining.

Head with the front rather wide, nearly flat, and slightly wider at top than at bottom, the lateral margins feebly expanded from bottom to vertex, then parallel to occiput, and with a broad, shallow, longitudinal groove extending from the epistoma to vertex, and only feebly indicated on the occiput; surface sparsely, coarsely punctate, strongly rugose, and sparsely clothed with rather short, recumbent, whitish pubescence; epistoma rather narrow between the antennae and broadly, but not deeply, arcuately emarginate in front; antennae scarcely extending to middle of pronotum, serrate from the fifth joint, and the outer joints distinctly wider than long; eyes large, broadly oval, and equally rounded above and beneath.

Pronotum slightly wider than long, feebly narrower at apex than base, and equal in width at apical third and posterior angles; sides feebly, arcuately rounded from apical angles to basal fourth, then arcuately constricted to the posterior angles, which are strongly expanded outward; when viewed from the side the marginal carina is very distinct and bisinuate, the submarginal carina nearly straight, rather indistinct, the two carinae widely separated anteriorly, and connected to each other at basal third; anterior margin strongly sinuate and with a broadly rounded median lobe; base feebly, broadly emarginate at middle of each elytron, the median lobe strongly, broadly rounded and broadly subtruncate in front of scutellum; disk strongly convex, with a vague, longitudinal, median depression posteriorly, broadly but not deeply depressed along lateral margins at middle, and with feebly indicated, arcuate, prehumeral carinae; surface coarsely, densely rugose, sparsely, finely punctate between the rugae, and sparsely clothed with very short, recumbent, whitish pubescence. Scutellum not transversely carinate, the surface uneven and obsoletely reticulate.

Elytra as wide as pronotum at base, and slightly wider at base than behind middle; sides parallel for a short distance behind base, feebly, broadly constricted at middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather narrowly rounded, but not serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, sutural margins strongly elevated posteriorly, with very broad, shallow basal depressions, but without a longitudinal carina between humeri and lateral margin; surface finely densely imbricate-punctate, and sparsely, uniformly clothed with short recumbent, whitish pubescence.

Abdomen beneath obsoletely granulose, densely, finely, transversely rugose, and sparsely clothed with short, recumbent, whitish hairs; first and second segments convex at middle, and the suture between the two segments feebly indicated at the sides; last segment broadly rounded at apex, vertical portions of segments more densely pubescent than ventral surface, pygidium sparsely, coarsely punctate and with a feebly elevated, longitudinal carina, which does not project posteriorly. Prosternum finely, densely punctate, and sparsely clothed with short, recumbent, whitish pubescence; prosternal lobe narrow, strongly declivous, and broadly, vaguely emarginate or subtruncate in front; prosternal process broad, the sides parallel to the apex, which is truncate. Tibiae slender, straight, and without a distinct tooth at apex. Posterior tarsi nearly as long as the tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth shorter than outer one, and not turned inward.

Length, 8 mm.; width, 2.25 mm.

Male.—Differs from the female in having the front of head slightly narrower, the lateral margins slightly more expanded above middle, and the surface more densely punctured, and densely clothed with long, recumbent, whitish pubescence; first and second abdominal segments broadly but not deeply, longitudinally sulcate at middle; prosternum densely clothed with long, erect, whitish pubescence, which extends along middle of body to second abdominal segment, and the anterior and middle tibiae armed with a short tooth on inner margin at apex.

Redescribed from the female type in the Museum of Comparative Zoölogy.

Type locality.—Texas. (No definite locality given.)

DISTRIBUTION

Material examined:

KANSAS: Grove, Hamilton, and Clark Counties, June (F. H. Snow). Scott County, June (H. Deay). Wallace County, June (Popenoe). Belvidere (W. Knaus). Garden City, June 2, 1900 (——).

OKLAHOMA: Stillwater (A. N. Caudell). Walter, May (——).

TEXAS: Brownsville (——). Lexington, April-May (Birkmann). Fedor, June (——). Victoria, April-May; Childress, June 8, 1906; Goliad County, March 25, 1907 (J. D. Mitchell). Wharton, April 18, 1905 (W. W. Yothers). Handley, April 27, 1905; College Station, March 16, 1907 (W. D. Pierce). Calvert, April 8, 1907 (C. R. Jones). Hempstead, April 24, 1904 (F. C. Bishopp), Gainesville, May 11, 1922 (E. E. Russell). Hallettsville, March 18, 1908 (C. E. Hood). Cypress Mills (——).

Chamberlin (1926) records it from Colorado, but no examples have been seen from that State.

Variations.—The color is usually plumbeus, but occasionally specimens are found that are slightly cupreous brown and more shining. The sides of the pronotum are more or less variable in shape, and the median depression is entirely absent in some examples. The prehumeral carinae are at most only feebly indicated, and specimens occur without any trace of it. Length 4.75 to 9 millimeters.

Host.—The larval habits are unknown, but the adults have been collected in Texas on *Callirhoe involucrata* Gray, which may be its host plant.

107. AGRILUS LACUSTRIS LeConte

Figure 83

Agrilus lacustris LeConte, In Agassiz Lake Superior, 1850, p. 227 (only listed, no description); Trans. Amer. Philos. Soc., vol. 11, 1859, p. 250.—Pettit, Canad. Ent., vol. 2, 1870, p. 102.—Hubbard and Schwarz, Proc. Amer. Philos. Soc., vol. 17, 1878, p. 636.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 330–331, pl. 8, fig. 10.—Fall, Calif. Acad. Sci., Occasional Papers, no. 8, 1901, p. 121.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 5, no. 3, 1902, p. 269.—Fall and Cockerell, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 181.—Blatchley, Coleoptera of Indiana, 1910, p. 804.—Woodworth, Guide to California Insects, 1913, p. 195.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 223.—Champlain and Knull, Ann. Ent. Soc. Amer., vol. 18, 1925, p. 470.—Chamberlin, Cat. Buprestidae, 1926, pp. 67–68.

Agrilus cuneus LeConte, Proc. Acad. Nat. Sci. Phila., vol. 18, 1866, p. 384.—Horn, Proc. Calif. Acad. Sci., vol. 4, ser. 2, 1894, p. 329.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67.

Agrilus pubiventris Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 95.

Female.—Form moderately elongate, subopaque, and above uniformly dark brown, with a bronzy or cupreous tinge; beneath similar in color to above, but more shining.

Head with the front rather wide, feebly convex, and about equal in width at top and bottom, the lateral margins nearly parallel to each other, and without a distinct median groove; surface rather strongly, irregularly rugose, obsoletely granulose, and sparsely clothed with short, recumbent, whitish pubescence; epistoma not transverse between the antennae, and broadly, but not deeply, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes moderately large, broadly oblong, and more acutely rounded beneath than above.

Pronotum slightly wider than long, base and apex about equal in width, and widest at apical third; sides arcuately rounded from apical angles to basal fourth, then strongly sinuate to the posterior angles, which are nearly rectangular; when viewed from the side the marginal and submarginal carinae are more or less sinuate, rather widely separated, and connected to each other near the base; anterior margin feebly sinuate, and with a broadly rounded median lobe; base transversely sinuate to middle of each elytron, then with a broadly rounded median lobe, which is arcuately emarginate in front of scutellum; disk rather strongly convex, without a distinct median depression, but with moderately deep, elongate, lateral depressions, and with feebly indicated prehumeral carinae; surface coarsely, closely, transversely rugose, finely, sparsely punctate between the rugae, and without distinct pubescence, except for a few hairs in the lateral depressions. Scutellum vaguely, transversely carinate, and the surface obsoletely reticulate.

Elytra as wide as pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted near middle, feebly, broadly expanded behind middle, then obliquely narrowed to the tips, which are separately, broadly rounded, and strongly serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, sutural margins feebly elevated posteriorly, and with broad, shallow, basal depressions, surface rather densely, coarsely, imbricate-punctate, and clothed with a few obsolete whitish hairs, which are only visible with a high-power lens.

Abdomen beneath finely, irregularly, transversely striolate, finely sparsely punctate, and sparsely clothed with short, inconspicuous, whitish hairs; first two segments convex at middle; last segment broadly rounded at apex; vertical portions of the segments not conspicuously pubescent; pygidium feebly, longitudinally carinate, but the carina not projecting posteriorly. Prosternum coarsely, transversely rugose, and sparsely clothed with short, inconspicuous hairs; prosternal lobe broad, slightly declivous, and broadly rounded in front; prosternal process very broad, the sides nearly parallel to apex, which is truncate, with a distinct median tooth. Posterior coxae with the posterior margin strongly, arcuately emarginate, and the exterior angle acute and more or less prolonged. Tibiae slender and unarmed at apex. Posterior tarsi as long as the tibiae, and the first joint not quite as long as the following three joints united. Tarsal claws similar on all feet, cleft near the base, the outer tooth long and acute, the inner tooth very broad, about one-half as long as outer one, and not turned inward.

Length, 4.75 mm.; width, 1.2 mm.

Male.—Differs from the female in having the prosternum densely, finely punctate, and densely clothed with long, erect, whitish pubescence, which is broadly extended along median part of body to the abdomen; first and second abdominal segments broadly, longitudinally concave, and the concavity densely clothed with long, semierect, whitish hairs, which point obliquely backward toward the median line of the concavity; posterior tarsi distinctly longer than the tibiae, and the first joint as long as the following three joints united, and the anterior and middle tibiae armed with a short, straight tooth on the inner margin at apex.

Redescribed from the female type (specimen No. 1) in the Museum of Comparative Zoölogy.

Type locality.—Of *lacustris*, La Pointe, Wis., Lake Superior; type in Museum of Comparative Zoölogy, at Cambridge, Mass. Of *cuneus*, Texas, no definite locality given; type in the Ulke Collection, in the Carnegie Museum at Pittsburgh. Of *pubiventris*, Texas, no definite locality given; cotypes in the Philadelphia Academy of Natural Sciences, and the Museum of Comparative Zoölogy.

DISTRIBUTION

Material examined:

ARIZONA: Diamond Creek, White Mountains, June, 1925 (D. Duncan), Santa Rita Mountains, July, 1926 (W. J. Chamberlin).

CALIFORNIA: Delrey (Dr. Clark). San Bernardino County (D. W. Coquillett).

ILLINOIS: No definite locality.

KANSAS: Clark County, June (F. H. Snow). Englewood, June 23, 1902; Phillips County, July (——).

NEW MEXICO: Albuquerque, June 27 (H. F. Wickham).

OKLAHOMA: Wichita National Forest, June 6, 1926 (W. J. Brown).

TEXAS: Columbus, April-August (Hubbard and Schwarz) (R. A. Cushman). Beeville, October 22 (Hubbard and Schwarz). Austin, July 8; Laredo, May 27; Rockport, August 11 (E. A. Schwarz). Corsicana, June 7 (H. Soltau). Padre Island, June 24, 1914; Victoria, March-July; Point Lavaca, August 21; Edna, July 19, 1908 (J. D. Mitchell). Hempstead, June 15, 1907 (C. E. Hood). Trinity, August 30, 1906 (F. C. Bishopp). Willow City, May 26, 1906; Corpus Christi, September 22, 1905 (F. C. Pratt). Clarenden, August 11 (W. D. Pierce). Lexington, May, 1909 (Birkmann). Cypress Mills; Fedor, Lee County (——).

WISCONSIN: La Pointe.

It has also been recorded in the literature from Grimsly, Ontario; San José del Cabo, Lower California; Bellevue and Colorado Springs, Colorado; Pecos and Santa Fé, New Mexico. Chamberlin (1926) records it from Florida and New Jersey, but these records probably refer to *imbellis* Crotch.

Variations.—This species shows considerable variation. The color varies from a bronzy brown, through various shades of bronzy green, with an occasional blue specimen. Sometimes the lateral margins of the head are nearly parallel to each other, the surface with a vague longitudinal groove, and the outer joints of the antennae are frequently wider than long. Usually the pronotum is slightly wider at the apex than at the base, and the sides are obliquely narrowed from the apical angles to the base, sometimes there is an obsolete median depression, and the prehumeral carinae are more or less variable in distinctness. The scutellum may be transversely carinate or not, and sometimes the carina is interrupted in the middle. Length 4 to 7.5 millimeters.

Hosts.—The adults have been taken a number of times by different collectors in Texas on *Croton* sp., and by Van Dyke in California on white oak (*Quercus* sp.). Chittenden (1900) records it as having been bred from *Croton capitatum* in Texas by E. A. Schwarz, but the specimens in the collection collected by Schwarz in Texas are labeled "On *Croton capitatum* and *Croton eleagnifolium*."

This species is closely allied to *imbellis* Crotch, and small specimens may be easily confused with that species, but it can be separated from *imbellis* by having the eyes more acutely rounded beneath than above, and the posterior tarsi of the males are distinctly longer than the tibiae. It was originally described from two small brownish specimens from the Lake Superior region, and at first sight, seems entirely different from the large green examples from Texas, which were described by Le Conte as *cuneus*, but in carefully examining the two forms no structural character was found for separating them, as the type specimens were almost identical with small specimens from Texas except in color. The two type specimens are male and female, but it was not advisable to extract the male genitalia. LeConte described *cuneus* from a single example in the Ulke collection, and Crotch (1873), not finding the type in the LeConte collection, subsequently described it as *pubiventris*. Chamberlin (1926) gives *advena* as a synonym, but this name should be dropped from our lists, as it was simply used by LeConte[6] in a list of the Coleoptera of Lake Superior, without giving any description, and it is impossible to determine what species he had before him.

108. AGRILUS IMBELLIS Crotch

Figure 84

Agrilus imbellis Crotch, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, pp. 94–95.—Schwarz, Proc. Amer. Philos. Soc., vol. 17, 1878, p. 452.—Blanchard, Ent. Amer., vol. 5, 1889, p. 32.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 332, pl. 8, fig. 14.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 68.—Easton, Psyche, vol. 16, 1909, p. 50.—Wickham, Bull. Buffalo Soc. Nat. Sci., vol. 9, 1909, p. 401.—Smith, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295.—Nicolay, Bull. Brooklyn Ent. Soc., vol. 14, 1919, p. 20.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 223.—Knull, Canad. Ent., vol. 54, 1922, p. 85.—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 9.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 53.—Chamberlin, Cat. Buprestidae, 1926, pp. 65–66.

Male.—Form short, rather robust, feebly shining, uniformly aeneous, and with a slight cupreous tinge; beneath more shining than above.

Head with the front rather wide, feebly convex, and feebly wider at top than at bottom, the lateral margins vaguely expanded from bottom to top, and with a broad, obsolete, longitudinal groove on the front; surface coarsely punctate on the front, becoming more or less transversely rugose on the occiput, and sparsely clothed anteriorly with short, recumbent, whitish hairs; epistoma slightly transverse between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending beyond middle of pronotum, serrate from the fifth joint, and the other joints about as wide as long; eyes moderately large, broadly oval, and about equally rounded beneath and above.

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[6] In Louis Agassiz, Lake Superior, 1850, p. 227.

Pronotum nearly one-fourth wider than long, base and apex about equal in width, and widest near middle; sides feebly, arcuately rounded to near the base, where they are nearly parallel; when viewed from the side the marginal carina is slightly sinuate, the submarginal carina a little more sinuate, the two carinae rather widely separated anteriorly and connected to each other near basal fourth; anterior margin strongly sinuate, with a broadly rounded, median lobe; base transversely sinuate to middle of each elytron, with the median lobe broadly rounded, and subtruncate or feebly emarginate in front of scutellum; disk strongly convex, without a median depression, but with shallow, oblong, lateral depressions, and moderately elevated, straight prehumeral carinae, extending from base to near the middle; surface rather coarsely, transversely rugose, with numerous fine punctures between the rugae, and from each puncture arises a very short, inconspicuous white hair. Scutellum vaguely, transversely carinate, and the surface finely, densely reticulate.

Elytra as wide as pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted at middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather narrowly rounded, and strongly serrulate; sides of abdomen rather broadly exposed above; disk feebly, longitudinally depressed along the sutural margins, and with broad, moderately deep basal depressions; surface rather coarsely imbricate-punctate, and clothed with a few short, inconspicuous, whitish hairs, which are only seen under a high-power lens.

Abdomen beneath finely, irregularly, transversely striolate, finely, rather densely punctate, and sparsely clothed with short, recumbent, whitish pubescence; first and second segments broadly, longitudinally concave, the concavity densely punctate, and rather densely clothed with moderately long, inconspicuous, whitish hairs; last segment broadly rounded at apex; vertical portions of the segments not conspicuously pubescent; pygidium feebly punctate, with a smooth median line, but not distinctly carinate. Prosternum finely, transversely rugose, sparsely punctate, and rather densely clothed with long, erect, inconspicuous pubescence, which extends along middle of body to abdomen; prosternal lobe broad, slightly declivous, and broadly rounded in front; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Posterior coxae with the posterior margin strongly, arcuately emarginate, the exterior angle acute, and somewhat prolonged. Tibiae slender, anterior pair slightly arcuate, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth long and acute, the inner tooth broad at apex, about one-half as long as outer one, and not turned inward.

Length, 5.25 mm.; width, 1.5 mm.

Female.—Differs from the male in having the front of head slightly wider, more cupreous, and not so coarsely rugose; antennae slightly shorter, and the outer joints wider than long; prosternum more coarsely rugose and without long, erect pubescence; first two abdominal segments convex, not very densely punctate, and without long pubescence at middle, and the tibiae unarmed at apex.

Redescribed from the male type, No. 2713, in the Philadelphia Academy of Natural Sciences.

Type locality.—Florida.

DISTRIBUTION

Material examined:

ALABAMA: Mobile (J. D. Sherman). Spring Hill, May 6, 1911 (H. P. Loding).

CONNECTICUT: Cornwall, June–July (C. A. Frost) (Chamberlin). Westville, July 4, 1904 (W. E. Britton). New Haven, July 19, 1905 (B. H. Walden).

DISTRICT OF COLUMBIA: Washington, June 2–July 8 (Hubbard and Schwarz).

FLORIDA: New Smyrna, June; Tampa, April 29; Jacksonville (Hubbard and Schwarz). Duval County (Ashmead). Gainesville, May 7, 1925 (G. B. Merrill). Fort Myers, April 22; Cleveland, April 26 (J. N. Knull). Sanford, May 13 (——). Cedar Keys, June 7 (——). Crescent City, April, 1908 (Van Duzee).

GEORGIA: No definite locality.

MARYLAND: Bladensburg, June–July (Hubbard and Schwarz).

MASSACHUSETTS: Nantucket Island (——). Saugus, August 22 (C. A. Frost).

NEW JERSEY: Woodbury, June 17 (——). Da Costa, July 21 (——). Westville, June 14 (——).

NEW YORK: Yaphank, June 19 (Davis). Queens, July 10 (Schott).

PENNSYLVANIA: Pittsburgh (H. G. Klages).

VIRGINIA: East Falls Church, July 16, 1917 (L. N. Gabrielson).

Chamberlin (1926) records Arizona, Texas, and Lower California, but these records are probably from misidentified specimens of *lacustris*.

Variations.—The coloration of this species varies from bronzy brown to cupreous brown. In some examples the groove on the front of head is scarcely visible, the sides of the pronotum are obliquely narrowed from the apical angles to base, the prehumeral carinae are obsolete, and sometimes the scutellum is without a distinct transverse carina. In the males the first and second abdominal segments are frequently longitudinally concave and pubescent similar to *lacustris.* Length 3.75 to 5.5 millimeters.

Host.—The larval habits are unknown but the adults have been collected a number of times by different collectors on Frostweed (*Helianthemum canadensis* (Linnaeus) Michaux.). Chamberlin (1926) records it as having been reared from yellow locust (*Robinia pseudoacacia* Linnaeus), but this record probably refers to *egenus* Gory, a very closely allied species which breeds in that tree.

This species is closely allied to *lacustris* LeConte, but in that species the posterior tarsi of the males are distinctly longer than the tibiae, the eyes are usually more acutely rounded beneath, the pubescence on the elytra is usually scarcely visible, and frequently the pronotum is obsoletely depressed at the middle. From the records available, *imbellis* seems to be confined to the Atlantic States, from Massachusetts to Alabama, and *lacustris* to the Middle West, extending from Lake Superior to Texas, and westward to southern California. Horn (1891) separates this species from *lacustris* on the first two ventral segments of the male being flattened and without pubescence, but on examining the type of *imbellis*, these segments were found to be longitudinally concave, and the pubescence was also as long as in *lacustris.*

109. AGRILUS BARBERI, new species

Figure 85

Male.—Form moderately elongate, slightly flattened, moderately shining, and bronzy green, with a more or less distinct aureous or cupreous tinge; beneath similar in color to above, but more shining.

Head with the front broad, nearly flat, about equal in width at top and bottom, the sides nearly parallel to each other, and with a narrow, median groove extending from occiput to vertex; surface finely scabrous, more or less rugose, finely punctate, and rather densely clothed with long, recumbent, white hairs; epistoma transverse between the antennae, broadly, deeply, arcuately emarginate, in front, and the clypeal suture distinct; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints longer than wide; eyes moderately large, rather broadly oval, and slightly more acutely rounded beneath than above.

Pronotum about one-fourth wider than long, slightly wider at apex than base, and widest at apical angles; sides feebly, obliquely narrowed from apical angles to posterior angles, which are rectangular; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina nearly straight, the two carinae narrowly separated anteriorly, and connected to each other behind the middle; anterior margin, strongly sinuate, and the median lobe broadly rounded, but not strongly produced; base transversely bisinuate, the median lobe vaguely produced, and subtruncate in front of scutellum; disk moderately convex, without a median depression, but vaguely transversely concave on basal half, with a broad, deep depression on each side along the lateral margin, and with sharply elevated, short prehumeral carinae; surface obsoletely granulose, coarsely, deeply rugose, somewhat scabrous at middle, finely, sparsely punctate between the rugae, and without distinct pubescence. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and about equal in width at base and at apical third; sides slightly expanded for a short distance behind base, broadly, arcuately constricted in front of middle, broadly expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and strongly serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, vaguely depressed along the sutural margins, which are slightly elevated posteriorly, and with broad, shallow, basal depressions; surface densely, finely imbricate-punctate, and sparsely, uniformly clothed with short, inconspicuous, white hairs.

Abdomen beneath obsoletely granulose, finely, sparsely punctate, more or less rugose on basal segment, and sparsely clothed with moderately long, recumbent hairs; first and anterior part of second segment rather deeply, broadly, longitudinally concave, and clothed with long, semierect white hairs at the middle; vertical portions of the segments not conspicuously pubescent; pygidium without a projecting carina. Prosternum finely, densely punctate, finely rugose, and rather densely clothed with long, erect, white hairs; prosternal lobe broad, moderately declivous, broadly rounded in front, and with a broad, shallow, arcuate emargination at the middle; prosternal process broad, the sides vaguely expanded behind the coxal cavities, then obliquely narrowed to the apex, which is acute. Posterior coxae with the posterior margin feebly sinuate and arcuately emarginate, and the exterior angle obtuse, and vaguely prolonged. Tibiae slender, straight, and the anterior and middle pairs armed with an indistinct tooth on inner margin at apex. Posterior tarsi subequal in length to the tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, slightly shorter than outer one, and not turned inward.

Length, 5.25 mm.; width, 1.25 mm.

Female.—Differs from the male in being slightly more robust; front of head slightly broader and less pubescent; first abdominal segment convex at the middle, and the prosternum not clothed with long erect hairs.

Length, 5.5 mm.; width, 1.5 mm.

Type locality.—Williams, Ariz.

Type and allotype.—Cat. No. 41014, U.S.N.M.

Described from two specimens, male and female. The male type was collected at the type locality, July 9, by H. S. Barber and E. A. Schwarz, and the allotype is simply labeled "Arizona, Calder Collection."

This species resembles *imbellis* Crotch very closely, but can be separated from that species by having the prosternal lobe arcuately emarginate in front, eyes slightly more acutely rounded beneath than above, the outer joints of the antennae longer than wide, and also by the shape of the male genitalia.

110. AGRILUS ABDITUS Horn

Figure 86

Agrilus abditus Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 332–333.—Chamberlin, Cat. Buprestidae, 1926, p. 46.

Female.—Form similar to *egenus*, but slightly more robust, slightly flattened above, and feebly shining; head uniformly brownish cupreous; pronotum and elytra dark brown, with a distinct aeneous or cupreous tinge; beneath similar to above but more shining.

Head with the front rather wide, slightly convex, about equal in width at top and bottom, the lateral margins nearly parallel to each other, and with a narrow, shallow, longitudinal groove extending from the occiput to epistoma; surface feebly, sparsely punctate, slightly rugose, feebly shining, and not distinctly pubescent; epistoma slightly transverse between the antennae, and broadly but not very deeply, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fifth joint, and the outer joints slightly wider than long; eyes rather large, elongate, and slightly more acutely rounded beneath than above.

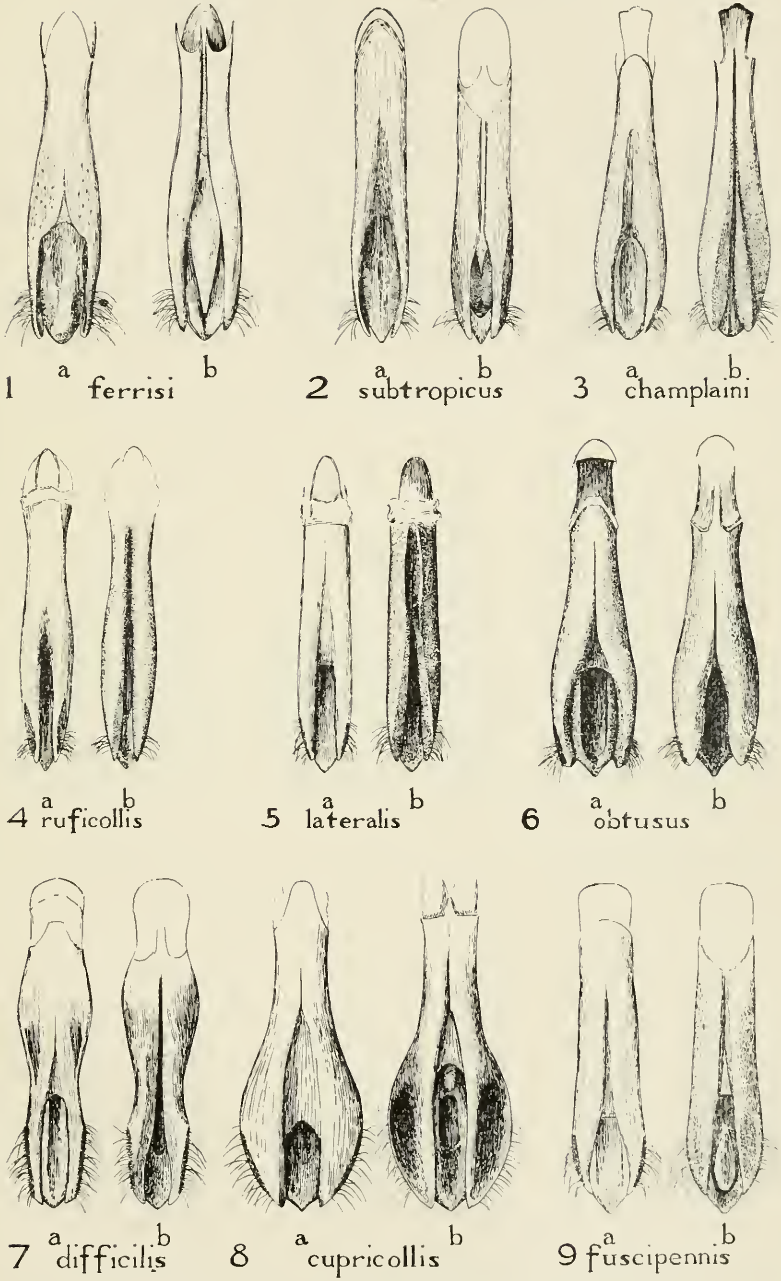
Pronotum slightly wider than long, about equal in width at base and apex, and widest near middle; sides feebly, arcuately rounded from apical angles to behind middle, then more strongly narrowed to near the base, where they are parallel, and the posterior angles rectangular; when viewed from the side the marginal carina is feebly sinuate, the submarginal carina nearly straight, the two carinae not very widely separated anteriorly, and connected to each other behind the middle; anterior margin rather strongly sinuate, with the median lobe strongly, broadly rounded; base acutely emarginate at middle of each elytron, the median lobe broadly rounded, and arcuately emarginate in front of scutellum; disk moderately convex, with a vague, elongate, median depression, a shallow, oblique depression on each side along lateral margin, and with distinct but not strongly elevated, arcuate prehumeral carinae; surface densely, coarsely rugose, the rugae transverse at middle, but becoming more or less longitudinal toward the sides, rather densely, finely punctate between the rugae, but without distinct pubescence. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, broadly, arcuately constricted in front of middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, rather narrowly rounded, and finely serrulate, sides of abdomen narrowly exposed above; disk feebly, longitudinally flattened along sutural margins, which are slightly elevated on apical half, and with broad, shallow basal depressions; surface densely, coarsely imbricate-punctate, and clothed with a few very short, inconspicuous hairs in basal depressions and on apical half.

Abdomen beneath obsoletely granulose, sparsely, finely punctate, the punctures more or less connected transversely by sinuate lines, becoming feebly rugose on basal segment, and very sparsely clothed with short, inconspicuous hairs; first segment convex at middle; last segment broadly rounded at apex; vertical portions of segments not conspicuously pubescent; pygidium sparsely, coarsely punctate, and the median line smooth, but not carinate. Prosternum finely, sparsely punctate, and sparsely clothed with short, recumbent hairs; prosternal lobe broad, feebly declivous, and broadly rounded in front; prosternal process broad, the sides rather strongly expanded behind the coxal cavities, and truncate at apex. Posterior coxae with the posterior margin slightly, arcuately emarginate, and the exterior angle feebly prolonged. Tibiae slender and without a distinct tooth on inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint nearly as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, much shorter than outer one, and not turned inward.

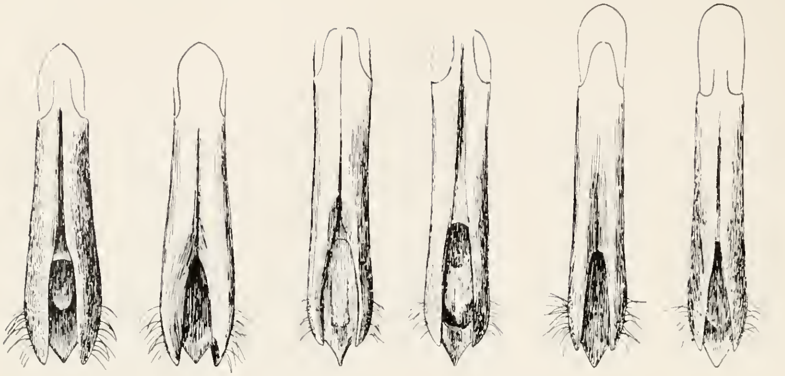
Length, 4.75 mm.; width, 1.25 mm.

Male.—Differs from the female in having the front of head subopaque, bronzy green, becoming brownish on the occiput, feebly convex, lateral margins feebly, arcuately expanded above the middle, and the surface densely, finely granulose, coarsely punctate in front, becoming feebly longitudinally rugose on occiput, and sparsely

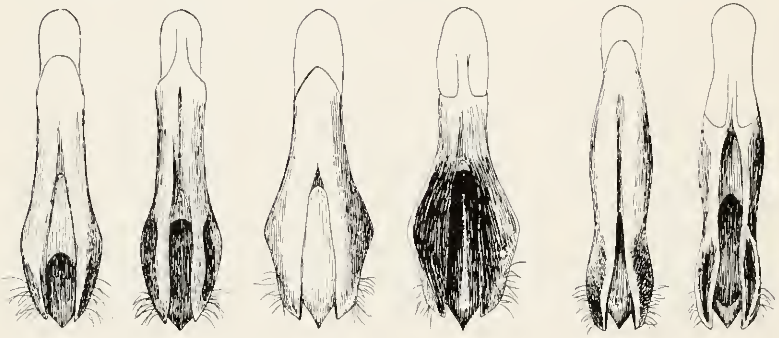

1 a ferrisi b
2 a subtropicus b
3 a champlaini b
4 a ruficollis b
5 a lateralis b
6 a obtusus b
7 a difficilis b
8 a cupricollis b
9 a fuscipennis b

GENITALIA OF THE BUPRESTID GENUS AGRILUS

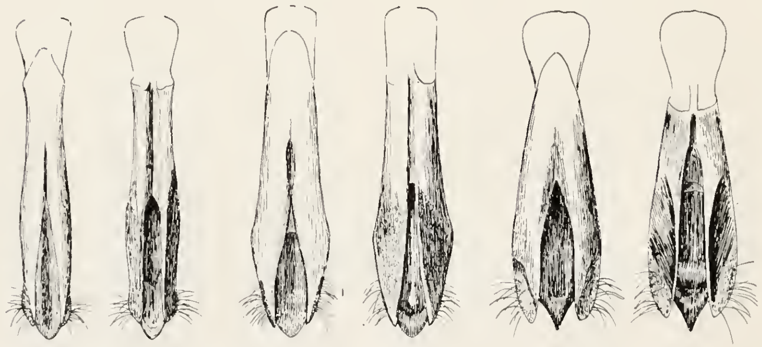
FOR EXPLANATION OF PLATE SEE PAGE 337



10 a angelicus b 11 a masculinus b 12 a paramasculinus b



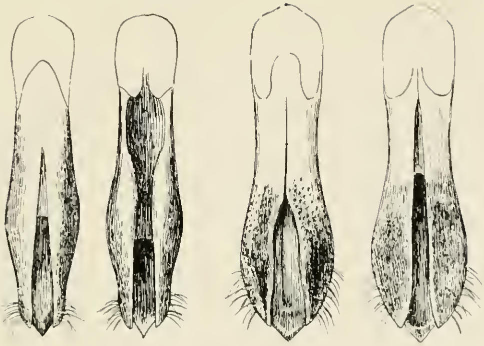
13 a arcuatus b 14 a crinicornis b 15 a defectus b



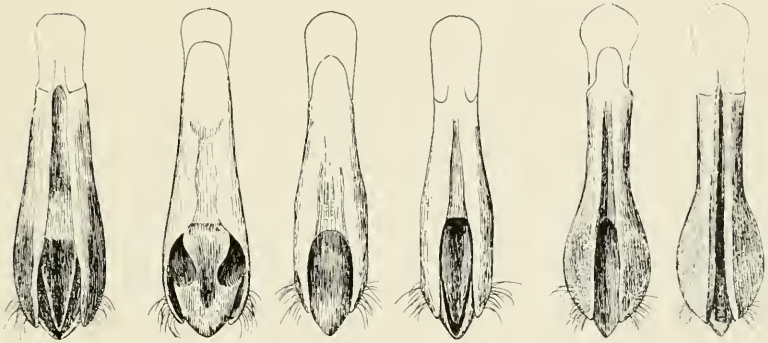
16 a geminatus b 17 a otiosus b 18 a atricornis b

Genitalia of the Buprestid genus Agrilus

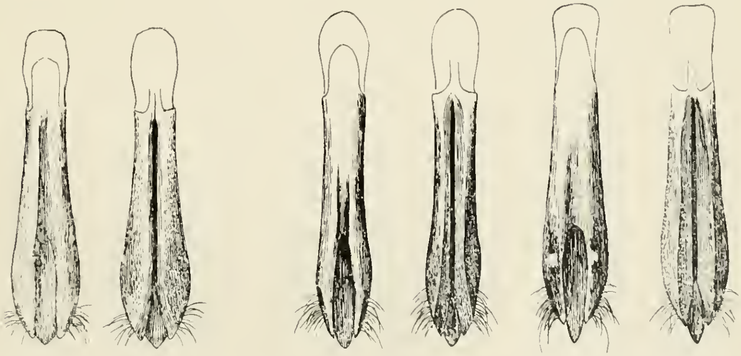
For explanation of plate see page 337



19 a transimpressus b 20 a frosti b 21 a juglandis b



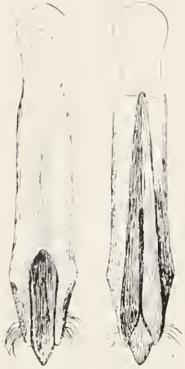
22 a macer b 23 a pulchellus b 24 a vittaticollis b



25 a benjamini b 26 a audax b 27 a bilineatus b

GENITALIA OF THE BUPRESTID GENUS AGRILUS

FOR EXPLANATION OF PLATE SEE PAGE 337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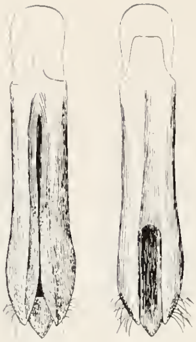
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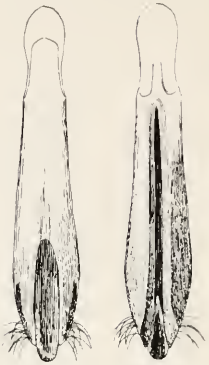
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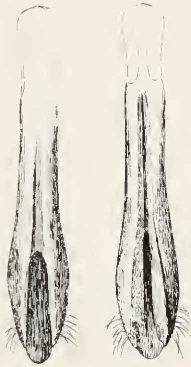
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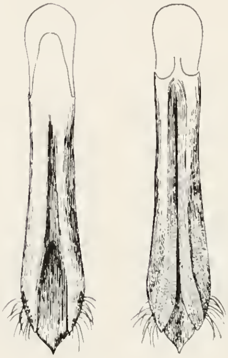
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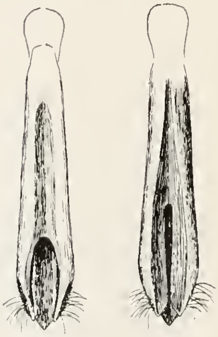
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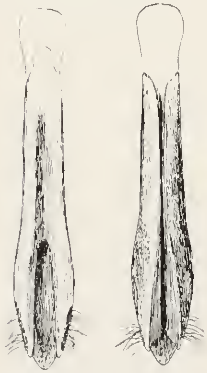
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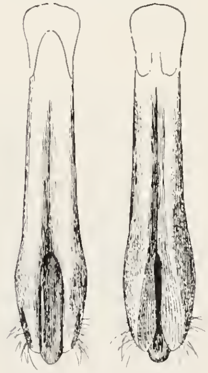
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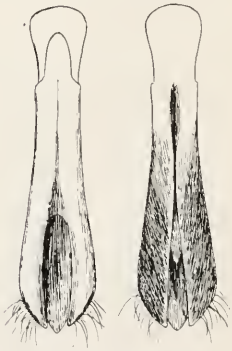
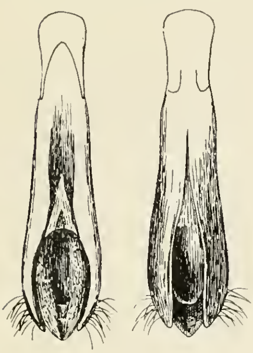
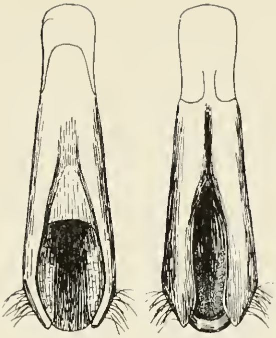

36 a cavatus b

GENITALIA OF THE BUPRESTID GENUS AGRILUS

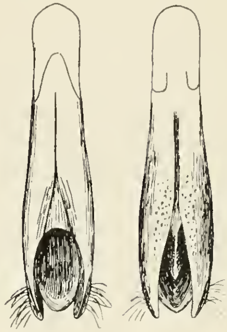
FOR EXPLANATION OF PLATE SEE PAGE 338



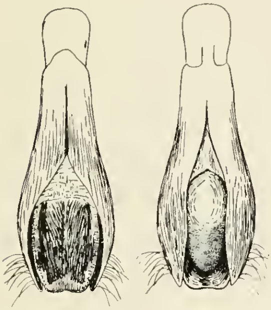
37 aureus



38 concinnus



39 walsinghami



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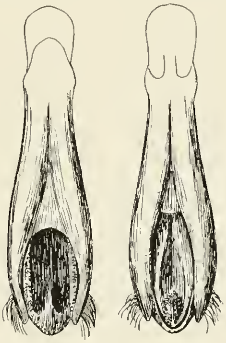
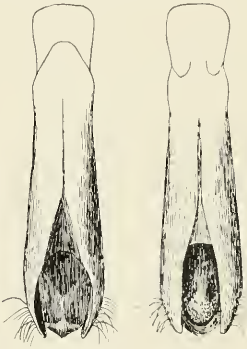


41 costipennis



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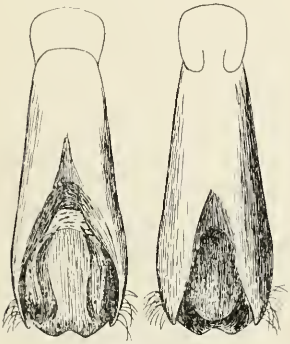

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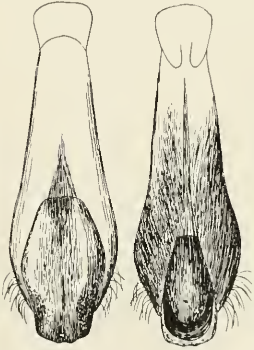
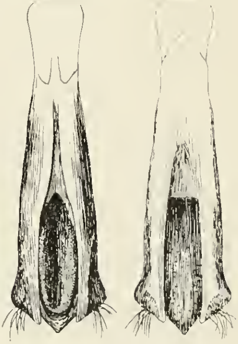


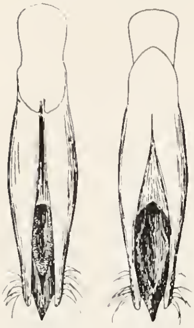
44 obolinus



45 fallax

Genitalia of the Buprestid genus Agrilus

For explanation of plate see page 338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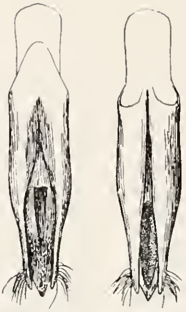
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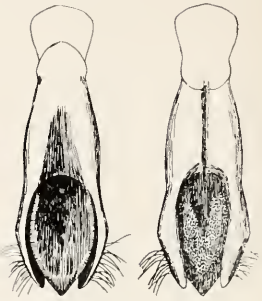
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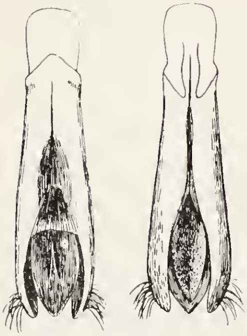
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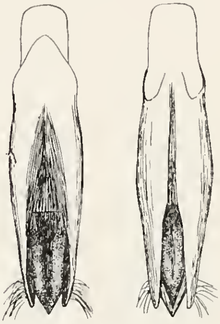
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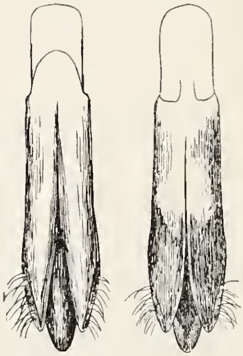
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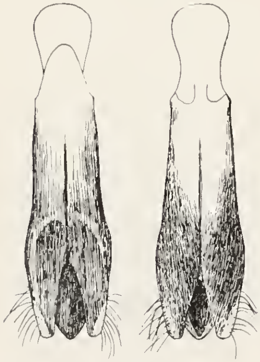
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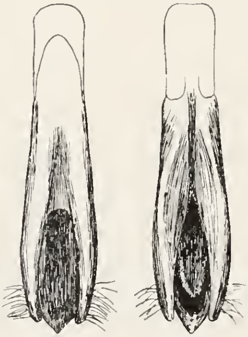
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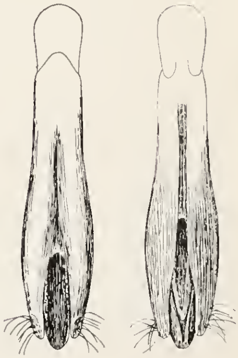
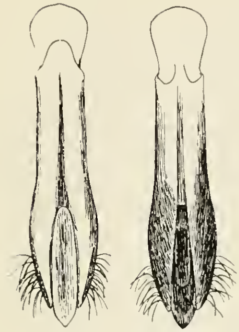
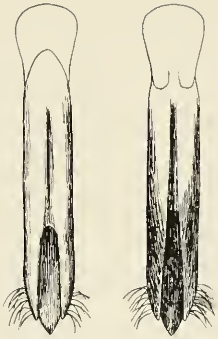

54 a coeruleus b

Genitalia of the Buprestid genus Agrilus

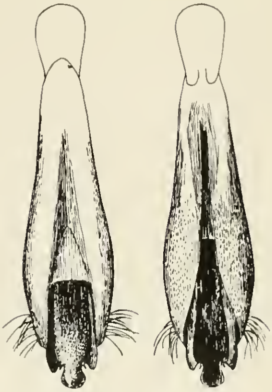
For explanation of plate see page 338



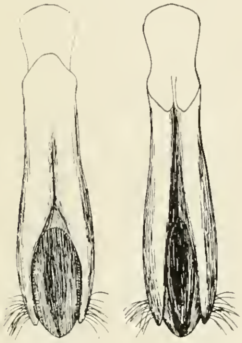
55 crataegi



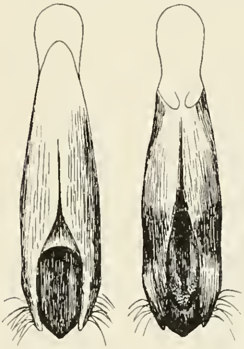
56 cephalicus



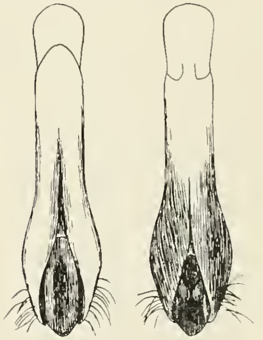
57 strigicollis



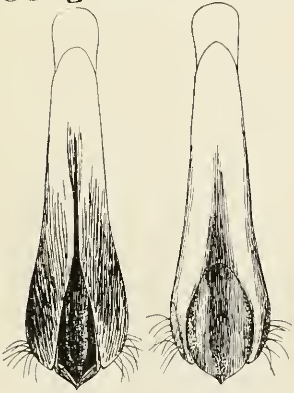
58 gibbicollis



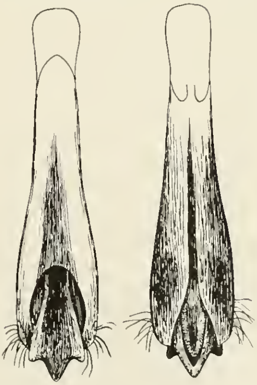
59 olentangyi



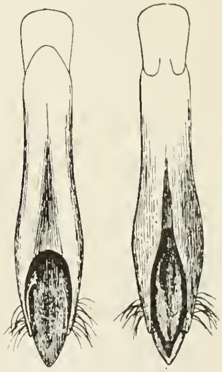
60 chiricahuae



61 aeneocephalus



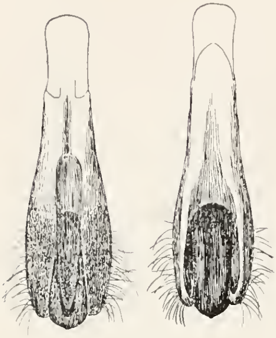
62 malvastri



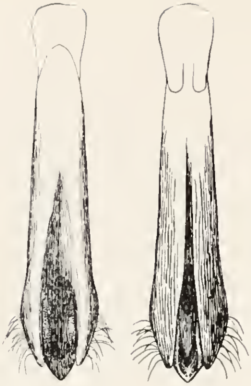
63 falli

GENITALIA OF THE BUPRESTID GENUS AGRILUS

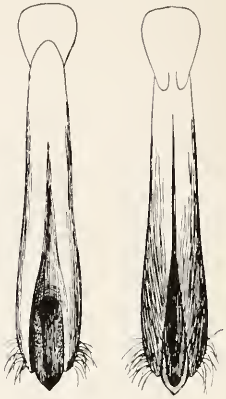
FOR EXPLANATION OF PLATE SEE PAGE 338



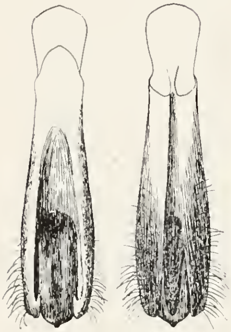
64 a illectus b



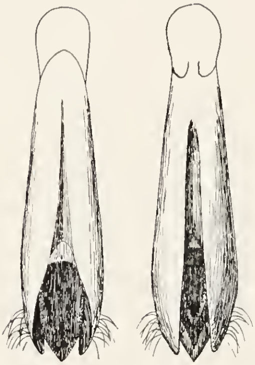
65 a felix b



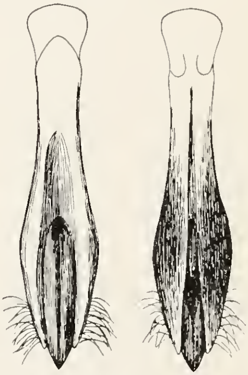
66 a. jacobinus b



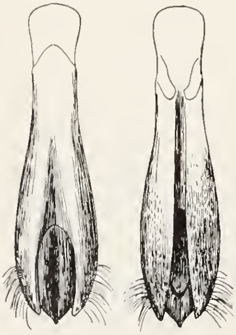
67 a. impexus b



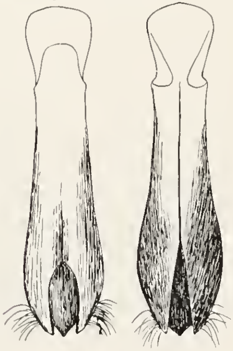
68 a cupreonitens b



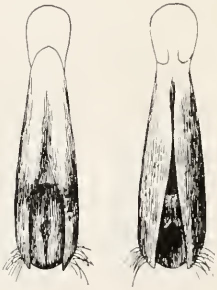
69 a quercus b



70 a palmacollis b



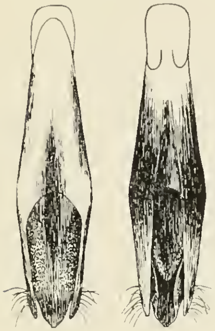
71 a prosopidis b

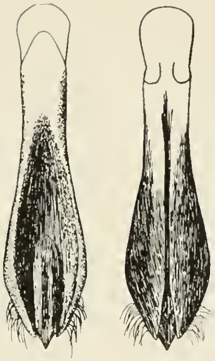


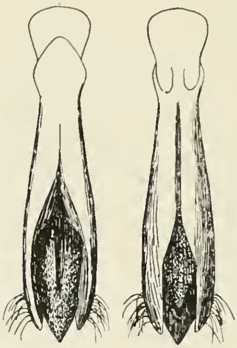
72 a exiguellus b

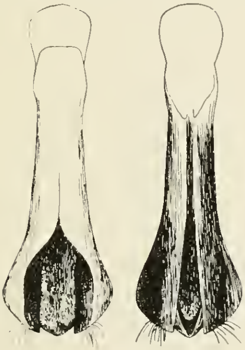
GENITALIA OF THE BUPRESTID GENUS AGRILUS

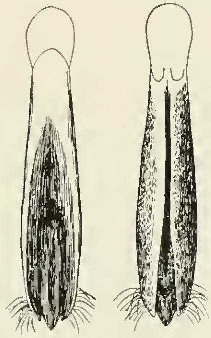
FOR EXPLANATION OF PLATE SEE PAGE 339

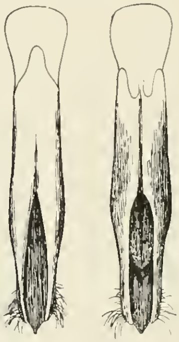

73 a acaciae b

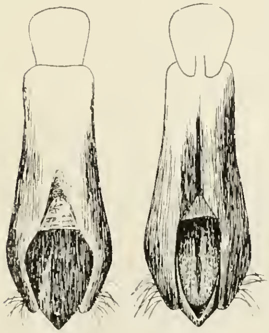

74 a abductus b

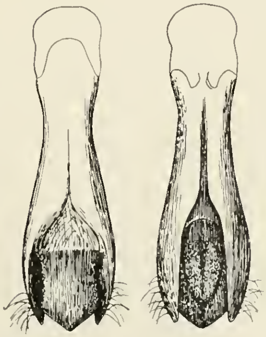

75 a pseudofallax b

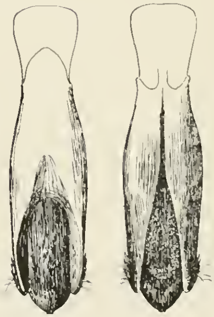

76 a egeniformis b.


77 a dolli b


78 a lecontei b

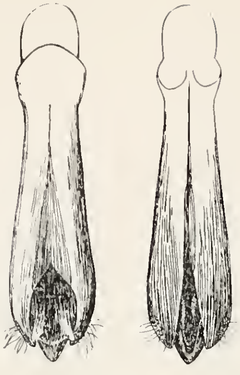

79 a abjectus b


80 a blandus b

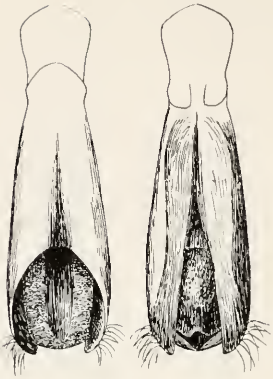

81 a subcinctus b

GENITALIA OF THE BUPRESTID GENUS AGRILUS

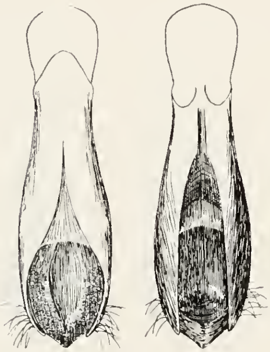
FOR EXPLANATION OF PLATE SEE PAGE 339



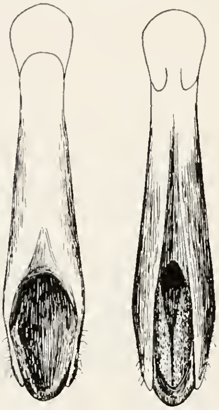
82 a muticus b



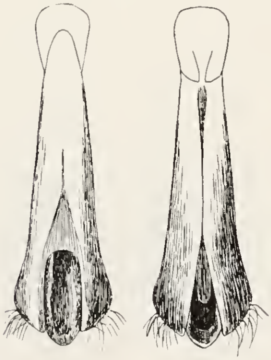
83 a lacustris b



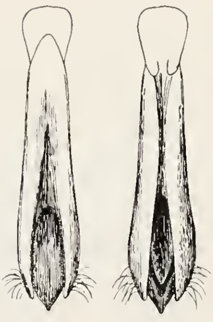
84 a imbellis b



85 a barberi b



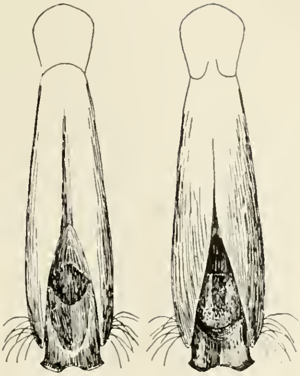
86 a abditus b



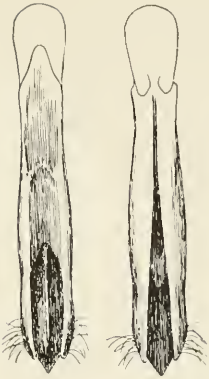
87 a pusillus b

Genitalia of the Buprestid genus Agrilus

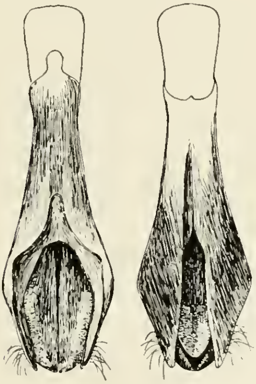
For explanation of plate see page 339



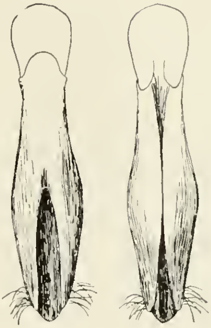
88 eleanorae



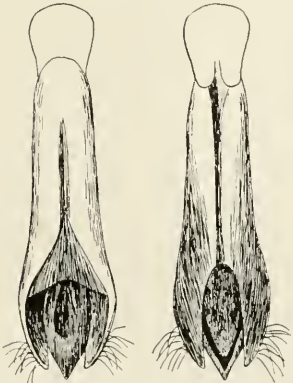
89 celti



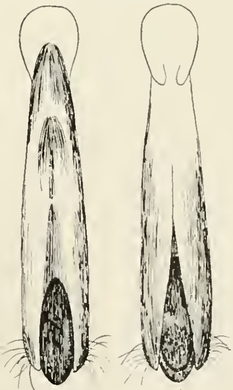
90 egenus



91 abstersus



92 putillus



93 oblongus

Genitalia of the Buprestid genus Agrilus

For explanation of plate see page 339

clothed with short, recumbent, whitish hairs; first abdominal segment slightly flattened but not conspicuously pubescent at middle; prosternum densely punctate, and densely clothed with long, semierect, whitish hairs, and the anterior and middle tibiae armed with a small tooth on inner margin at apex.

Redescribed from the female lectotype, No. 3495, in the Philadelphia Academy of Natural Sciences.

Type locality.—Western Nevada.

DISTRIBUTION

Material examined:

ARIZONA: Palmerlee (———). Huachuca Mountains, July 15–28 (J. S. Hine) (H. A. Wenzel). Carr Canyon, Huachuca Mountains, August, 1895 (H. Skinner). Santa Rita Mountains, 5,000–8,000 feet, July (F. H. Snow).
NEVADA: No definite locality (Morrison).

Variations.—Scarcely any variation was observed in the specimens examined, except in size, and the prosternal lobe, which is either broadly rounded, broadly subtruncate, or feebly emarginate in front. Length, 3 to 5.25 millimeters.

Host.—Unknown.

This species is closely allied to *imbellis* Crotch and *sierrae* Van Dyke. From the former the males can be separated by the first and second abdominal segments being longitudinally concave at the middle, and densely clothed with long pubescence, whereas in *imbellis* the first and second abdominal segments are feebly flattened at the middle, and not clothed with conspicuous hairs. There will be some difficulty in separating the females of these two species, but in *abditus* the pronotum is usually more longitudinally depressed, and the prehumeral carinae are sharply elevated. From *sierrae* it can be separated by not having the front of the head deeply depressed, and the marginal and submarginal carinae of the pronotum not separated from each other for their entire length.

111. AGRILUS PUBESCENS, new species

Male.—Form small, moderately elongate, slightly flattened above, and strongly shining; head reddish cupreous in front, and becoming piceous on the occiput; pronotum and elytra piceous, with a more or less cupreous tinge; beneath reddish cupreous, and more shining than above.

Head with the front broad, nearly flat, about equal in width at bottom and top, broadly, arcuately constricted at middle, and without a distinct median depression; surface densely, finely granulose, finely punctate, more or less longitudinally rugose on the occiput, and rather densely clothed with semierect, white hairs; epistoma slightly transverse between the antennae, broadly and rather deeply, arcuately emarginate in front, and the clypeal suture distinct; antennae extending slightly beyond middle of pronotum, serrate from the fifth joint, and the outer joints as wide as long; eyes large, broadly oval, and slightly more acutely rounded beneath than above.

Pronotum slightly wider than long, about equal in width at base and apex, and widest at middle; sides feebly, arcuately rounded from apical angles to behind middle, then obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the mrginal and submarginal carinae are feebly sinuate, narrowly separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, and the median lobe rounded and strongly produced; base feebly, arcuately emarginate at middle of each elytron, the median lobe broadly rounded, and feebly emarginate in front of scutellum; disk moderately convex, with a broad, shallow median depression extending from near anterior margin to base, a broad, shallow depression on each side along lateral margin, and with sharply defined, straight prehumeral carinae; surface obsoletely granulose, finely but not deeply rugose, finely, sparsely punctate between the rugae, which are more or less transverse at the middle, and sparsely clothed with short, inconspicuous, white hairs. Scutellum strongly, transversely carinate, and the surface densely reticulate.

Elytra slightly wider than pronotum at base, and equal in width at base and apical third; sides nearly parallel for a short distance behind base, feebly constricted in front of middle, feebly, broadly expanded behind middle, then obliquely narrowed to the tips, which are rather acutely rounded, and coarsely serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, the sutural margins rather strongly elevated behind the middle, and with broad, moderately deep basal depressions; surface finely, densely imbricate-punctate, and sparsely, uniformly clothed with short, recumbent, white hairs.

Abdomen beneath sparsely, finely punctate, the punctures connected transversely by sinuate lines, which are coarser on basal segment, and sparsely, uniformly clothed with short, recumbent, white hairs; first segment convex at middle; vertical portions of segments not conspicuously pubescent; pygidium longitudinally carinate, but the carina not projecting. Prosternum finely, sparsely punctate, and densely clothed with long, erect, fine hairs; prosternal lobe broad, feebly declivous, and broadly subtruncate in front; prosternal process rather broad, the sides nearly parallel to behind the coxal cavities, then strongly narrowed to the apex, which is acute, Posterior coxae with the posterior margin slightly sinuate, and the exterior angle rectangular and not prolonged. Tibiae slender, slightly arcuate, and the anterior and middle pairs armed with a distinct tooth on inner margin at apex. Posterior tarsi nearly as long as the tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, much shorter than outer one, and not turned inward. Genitalia similar to those of *celti.*

Female.—Differs from the male in having the front of head broader, and the lateral margins parallel to each other; antennae shorter; prosternum less densely punctured and not clothed with long, erect hairs, and the tibiae without a distinct tooth at apex.

Length, 4.5–5 mm.; width, 1–1.25 mm.

Type locality.—"Tanke Verde," Ariz.

Other localities.—Texas: Beeville, Kerrville, Dallas, Devil's River, and Sheffield.

Type, allotype, and paratypes.—Cat. No. 41015, U.S.N.M. Paratypes, California Academy of Sciences.

Described from 15 specimens (1 type). The type, allotype, and two paratypes reared from catclaw (*Acacia greggii* Gray) collected at the type locality by M. Chrisman (Hopk. U. S. No. 13700b^4); three paratypes labeled "Texas" from the Belfrage collection; three paratypes collected at Kerrville, Tex., April 22, 1908, and one at Devil's River, Tex., May 3, 1907, by F. C. Pratt; one paratype collected at Beeville, Tex., April 22 (Hubbard and Schwarz); one paratype from Dallas, Tex., April 25, 1907 (Schwarz and Pratt); and two paratypes collected at Sheffield, Tex., April 24, 1924, by J. O. Martin.

There are some slight variations among the paratypes, the head varying in color from bronzy green to reddish cupreous, and the median depression on front of head and pronotum are more or less variable in distinctness.

This species resembles *olentangyi* Champlain and Knull, but can be readily separated from that species by having the prosternal lobe broadly rounded or subtruncate in front, and by the different shape of the male genitalia.

112. AGRILUS PUSILLUS (Say)

Figure 87

Buprestis pusilla SAY, Ann. Lyc. Nat. Hist. New York. vol. 1, pt. 2, 1825, p. 252.—LECONTE, Say's Writings, vol. 1, p. 388 (Baillière Bros. ed., 1859; Cassino and Co. ed., 1883).

Agrilus pusillus SAY, Trans. Amer. Philos. Soc., vol. 6, new ser., 1836, p. 162.—LECONTE, Say's Writings, vol. 2, p. 596 (Baillière Bros. ed., 1859; Cassino and Co. ed., 1883); Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 244.—CROTCH, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873,

p. 92.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 1, no. 1, 1888, p. 87.—Horn, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 333–334.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 4, no. 3, 1898, p. 305.—Smith, 27th Ann. Rept. N. J. State Board Agric. for 1899 (1900), suppl. p. 258.—Wickham, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 5, no. 3, 1902, p. 269; vol. 6, no. 2, 1909, p. 23 (Author's ed.).—Smith, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295.—Blatchley, Coleoptera of Indiana, 1910, p. 805.—Mutchler and Weiss, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 10.—Knull, Canad. Ent., vol. 54, 1922, p. 84; Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 53–54.—Chamberlin, Cat. Buprestidae, 1926, p. 75—Criddle, 56th Rept. Ent. Soc. Ontario for 1925 (1926), p. 97.

Agrilus parvus Saunders, Cat. Buprestidarum, 1871, p. 116, no. 107 (unnecessary new name for *pusillus* Say).

Male.—Form short, feebly shining, and somewhat resembling a small *ruficollis;* head and pronotum aeneous or cupreous, the head usually green on the front, and the pronotum more reddish on the median part; elytra purplish-black; beneath piceous, with a strong aeneous tinge, and slightly more shining than above.

Head with the front rather wide, moderately convex, and about equal in width at top and bottom, the lateral margins usually feebly, arcuately constricted at the middle, and with a feeble, broad, more or less interrupted longitudinal groove extending from occiput to epistoma; surface densely, finely granulose, with a few coarse punctures intermixed, becoming somewhat longitudinally rugose on the occiput, and sparsely clothed anteriorly with short, recumbent, whitish hairs; epistoma rather narrow between the antennae, and broadly, but not deeply, arcuately emarginate in front; antennae extending to near middle of pronotum, serrate from the fifth joint, and the outer joints not longer than wide; eyes large, elongate, and more acutely rounded beneath than above.

Pronotum about one-fourth wider than long, narrower at base than at apex, and widest at middle or near apical angles; sides obliquely, or feebly, arcuately narrowed from apex to posterior angles, sometimes more or less parallel near the posterior angles, which are rectangular; when viewed from the side the marginal carina is more or less sinuate, the submarginal carina nearly straight, the two carinae narrowly separated anteriorly, and connected to each other at basal fourth; anterior margin strongly sinuate, with a broadly rounded median lobe; base strongly, transversely bisinuate, with the median lobe only feebly developed; disk moderately convex, with a broad, transverse depression in front of base, so when viewed laterally the median line of pronotum is more strongly convex on anterior half, with a deep depression on each side along lateral margin near middle, and with more or less distinct, straight prehumeral carinae extending from posterior angles to basal third; surface coarsely, transversely rugose, obsoletely granulose, and sparsely, finely punctate between the rugae. Scutellum with or without a transverse carina, and the surface finely, densely reticulate.

Elytra wider than pronotum at base, and about equal in width at base and behind middle; sides nearly parallel for a short distance behind base, feebly, arcuately constricted in front of middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and finely serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, usually with a broad, obsolete, longitudinal depression along the sutural margins, which are elevated posteriorly, and with broad, very shallow basal depressions; surface coarsely imbricate-punctate, and sparsely clothed with short, indistinct, whitish hairs.

Abdomen beneath rather finely, sparsely punctate, feebly, transversely, irregularly striolate, and sparsely, uniformly clothed with short, recumbent, whitish hairs; first and second segments feebly, broadly, longitudinally, concave, the concavity sparsely clothed with long, semierect, whitish hairs; vertical portions of segments not conspicuously pubescent; pygidium not carinate. Prosternum sparsely punctate, coarsely rugose, and sparsely clothed with long, erect, whitish hairs; prosternal lobe broad, slightly declivous, and broadly truncate, with a feeble emargination in front; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is acutely rounded. Posterior coxae with the posterior margin nearly transversely truncate or feebly sinute, and the anterior angle rectangular, and not prolonged. Tibiae slender, the anterior and middle pairs slightly arcuate, and armed with a short tooth on inner margin at apex. Posterior tarsi shorter than tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth long and acute, the inner tooth broad, about one-half as long as outer one, and not turned inward.

Length, 4.25 mm.; width, 1 mm.

Female.—Differs from the male in having the front of head more cupreous, not so coarsely granulose, or densely pubescent anteriorly; prosternum without long, erect hairs; anterior and middle tibiae unarmed at apex, and the first two abdominal segments convex, and not clothed with long pubescence at middle.

Redescribed from a male and female from Kerrville, Tex., in the United States National Museum collection. Since the type of this species has been lost, I am designating the male from which the above description was made as the neotype.

Type locality.—Missouri River.

DISTRIBUTION

Material examined:

ALABAMA: Langdale (H. H. Smith).

COLORADO: Littleton, June 22, 1911 (C. A. Frost).

IOWA: Iowa City, June 15, 1911 (Stoner). Lake Okoboji, July (L. L. Buchanan). Spirit Lake, June, 1896 (——).

KANSAS: Baldwin (J. C. Bridwell). Salina, and Sheridan County (——).

MINNESOTA: Ramsey County, July 11, 1923 (MacAndrews). Scott County, June 6 (——).

NEBRASKA: West Point, June 1888 (L. Bruner). Sand Hills, July (——).

PENNSYLVANIA: Hummelstown, June 12 (J. N. Knull).

SOUTH DAKOTA: No definite locality.

TEXAS: Kerrville, April 10, 1907 (F. C. Pratt). Dallas, May 9, 1896 (F. C. Bishopp). Austin, April 9, 1907 (R. A. Cushman). It has been recorded in the literature from Indiana, New Jersey, and Winnipeg, Manitoba, but no examples have been seen by the writer from these localities. It has also been recorded from Arizona from specimens identified by Doctor Horn as this species. These specimens which were collected in the Pinal Mountains by H. F. Wickham have been examined by the writer and are *chiricahuae* Fisher.

Variations.—Very little variation was noted except in size and color. The pronotum is bronzy green to reddish cupreous, usually with the median part more or less purplish, and sometimes the elytra are strongly aeneous. Length, 3.25 to 4.75 millimeters.

Host.—The larval habits are unknown, but the adults have been collected in Nebraska by Bruner, and in Texas by Bishopp on false indigo (*Amorpha fruticosa* Linnaeus.)

The general aspect of this species is that of a diminutive *ruficollis* Fabricius, but it can always be separated from that species by the serration of the antennae beginning with the fifth joint. It is closely allied to *egenus* Gory and *celti* Knull, and there may be some difficulty in separating the bronzy green females, but the males can be readily separated from those of *egenus* and *celti* by the genitalia. The name *parvus* has been suggested for this species by Saunders (1871), but there seems to be no valid reason for this change. Chamberlin (1926) places *pusillus* as a variety of *otiosus* Say, but this is incorrect, as *pusillus* is a valid species and does not fall in the same group with *otiosus*.

113. AGRILUS ELEANORAE, new species

Figure 88

Male.—Form small, robust, strongly flattened above, and moderately shining; head bronzy green in front, and becoming brownish cupreous on the occiput; pronotum and elytra uniformly brownish cupreous; beneath similar in color to above but more shining.

Head with the front rather broad, feebly convex, about equal in width at top and bottom the sides strongly, broadly constricted at the middle, and without a median depression; surface finely, densely granulose, slightly rugose, especially on occiput and behind the epistoma, and sparsely, uniformly clothed with short, recumbent, white hairs; epistoma slightly transverse between the antennae, broadly, deeply, arcuately emarginate in front, and the clypeal suture distinct; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes large, broadly oval, and equally rounded above and beneath.

Pronotum nearly as long as wide, equal in width at base and apex, and widest just behind the middle; sides feebly, obliquely expanded from apical angles to behind middle, then feebly, arcuately rounded to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are feebly sinuate, rather narrowly separated anteriorly, and connected to each other behind the middle; anterior margin strongly sinuate, the median lobe broadly rounded and strongly produced; base arcuately emarginate at middle of each elytron, the median lobe feebly produced, and subtruncate in front of scutellum; disk moderately convex, without a median depression, but vaguely, broadly, transversely depressed along basal half, with a moderately deep depression on each side along lateral margin, and with sharply elevated, straight, prehumeral carinae; surface very finely, distinctly, and obliquely rugose at middle, finely, sparsely punctate between the rugae, and not pubescent. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra about as wide as pronotum at base, and equal in width at base and apical third; sides nearly parallel for a short distance behind base, vaguely constricted in front of middle, feebly expanded behind middle, then obliquely narrowed to the tips, which are separately, narrowly rounded, and feebly serrulate; sides of abdomen rather broadly exposed above; disk slightly flattened, feebly depressed along the sutural margins, which are slightly elevated behind the middle, and with broad, moderately deep basal depressions; surface finely, densely, imbricate-punctate, and sparsely clothed with short, inconspicuous white hairs.

Abdomen beneath finely, sparsely punctate, the punctures connected transversely by sinuate lines, which are coarser on basal segment, and sparsely clothed with short, recumbent, white hairs; first and anterior part of second segment broadly, feebly, longitudinally concave, and clothed with longer and denser hairs at the middle; vertical portions of segments not densely pubescent; pygidium coarsely, sparsely punctate, longitudinally carinate anteriorly, but the carina not projecting. Prosternum finely, sparsely punctate, and rather densely clothed with long, erect, white hairs; prosternal lobe broad, moderately declivous, and broadly rounded or subtruncate in front, with a vague emargination at middle; prosternal process broad, the sides nearly parallel to behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Posterior coxae with the posterior margin transversely truncate externally, the exterior angle rectangular, and not prolonged. Tibiae slender, straight, and the anterior and middle pairs armed with a small tooth on inner margin at apex. Posterior tarsi slightly shorter than tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Length, 4.50 mm.; width, 1.13 mm.

Female.—Unknown.

Type locality.—Devil's River, Tex.

Type and paratype.—Cat. No. 41016, U.S.N.M.

Described from two males (one type), collected at the type locality, May 2, 1907, on *Pithecolobium* sp., by E. A. Schwarz.

This species resembles *celti* Knull and *egenus* Gory very closely, but can be separated from both these species by being a uniform brownish cupreous color, the pronotum nearly subequal in width and length, with the lateral margins nearly straight, and the surface very finely, distantly, and obliquely rugose, and the male with the median lobe of the genitalia strongly expanded and broadly subtruncate at the apex.

This species is named in honor of Miss Eleanor T. Armstrong, who has made considerable biological studies of some of the species of this genus in California, and who has also made the drawings for the present paper.

114. AGRILUS CELTI Knull

Figure 89

Agrilus celti Knull, Ent. News, vol. 31, 1920, pp. 11–12.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 223.—Nicolay, Journ. N. Y. Ent. Soc., vol. 29, 1921, p. 175.—Knull, Canad. Ent., vol. 54, 1922, p. 85.—Champlain and Knull, Ent. News, vol. 34, 1923, p. 85, fig. 1.—Knull, Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 52–53, pl. 1, fig. 1.—Chamberlin, Cat. Buprestidae, 1926, p. 56.

Agrilus egenus Hopkins, (not Gory), Insect Life, vol. 4, 1892, p. 259.

Male.—Form moderately elongate, similar to *egenus*, feebly shining, uniformly brownish or greenish bronze, except the head, which is light green, with a feeble aeneous tinge; beneath green, with a strong aeneo-cupreous tinge, and more shining than above.

Head with the front rather wide, nearly flat, about equal in width at top and bottom, the lateral margins feebly, arcuately constricted at middle, and with a feeble, narrow longitudinal groove on the vertex and occiput; surface densely, coarsely granulose on the front, with numerous large punctures intermixed, becoming longitudinally rugose on the occiput, and rather densely clothed on lower half with moderately long, recumbent, whitish pubescence; epistoma strongly transverse between the antennae and broadly, deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints vaguely longer than wide; eyes large, broadly elongate and more acutely rounded beneath than above.

Pronotum one-third wider than long, slightly narrower at base than at apex, and widest near middle; sides nearly parallel, or feebly, arcuately rounded to near basal fourth, than rather strongly narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal carina is strongly sinuate, the submarginal carina feebly sinuate, the two carinae narrowly separated anteriorly, and connected to each other at basal fourth; anterior margin strongly sinuate, with a broadly rounded median lobe; base transversely sinuate, with the median lobe feebly developed, and arcuately or subangularly emarginate in front of scutellum; disk moderately convex, with two feeble, round depressions placed longitudinally at the middle, of which the posterior one is the deepest, a large, deep depression on each side along lateral margin, and with strongly elevated, straight, prehumeral carinae, extending from base to the middle; surface rather coarsely, transversely rugose, finely, densely granulose, and finely, densely punctate between the rugae. Scutellum transversely carinate, and the surface finely, densely reticulate.

Elytra wider than pronotum at base, and about equal in width at base and behind middle; sides parallel for a short distance behind base, broadly, vaguely constricted near middle, feebly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, rather narrowly rounded, and coarsely serrulate; sides of abdomen scarcely visible from above; disk feebly, longitudinally depressed along the sutural margins, which are elevated posteriorly, and with broad, shallow basal depressions; surface rather coarsely, imbricate-punctate, and sparsely, uniformly clothed with short, inconspicuous, whitish hairs.

Abdomen beneath rather densely, finely punctate, becoming more or less irregularly striolate toward the sides of basal segments, and sparsely, uniformly clothed with short, recumbent, whitish pubescence; first and second segments flattened (the first feebly concave), and the median part more densely clothed with longer hairs; vertical portions of the segments slightly more densely pubescent than ventral surface; pygidium not distinctly carinate at middle. Prosternum rather coarsely, sparsely granulose, and rather densely clothed with long, erect, whitish hairs, which extend along middle of body to middle of second abdominal segment; prosternal lobe broad, feebly declivous, broadly rounded in front and with a broad, deep, arcuate emargination at the middle; prosternal process rather broad, the sides nearly parallel to behind the coxal cavities, then obliquely rounded to the apex. Posterior coxae with the posterior margin nearly transversely truncate or feebly sinuate, and the exterior angle rectangular. Tibiae slender, nearly straight, and the anterior and middle pairs armed with a short tooth on inner margin at apex. Posterior tarsi distinctly shorter than tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth long and acute, the inner tooth broad, about one-half as long as outer one, and not turned inward.

Length, 4.75 mm.; width, 1.2 mm.

Female.—Differs from the male in having the front of head more cupreous, and not so densely punctate, granulose or pubescent; prosternum more coarsely granulose, without long, erect pubescence, and the prosternal lobe not so deeply emarginate at middle; first two abdominal segments convex at middle, and without long pubescence, and the tibiae unarmed at apex.

Redescribed from the male type in the collection of J. N. Knull.

Type locality.—Hummelstown, Pa.

DISTRIBUTION

Material examined:

CONNECTICUT: Canaan, July 26, 1924 (C. A. Frost). Lyme, reared (W. S. Fisher). North Branford, June 2, 1921 (M. P. Zappe). New Haven, June 18, 1921 (B. H. Walden). Short Beach, July 14, 1904 (P. L. Butrich). Branford, July 3, 1905 (H. W. Winkley).

DISTRICT OF COLUMBIA: Rock Creek Park, May 28, 1922 (J. R. Malloch). Washington, June 18 (Hubbard and Schwarz).

ILLINOIS: Willow Springs, June 5, 1914; Riverside, June 10, 1913 (E. Liljeblad). Edgebrook, June 28, 1914 (Selinger). Galesburg, July 9, 1892; Lilly, June 11, 1914; La Grange (——).

KANSAS: Douglas County; Clark County, May (F. H. Snow). Salina (——).

MARYLAND: Hagerstown, May 22, 1913 (——). Plummer Island, June 15, 1905 (D. H. Clemons). Great Falls, May 23, 1915 (W. L. McAtee).

MICHIGAN: Agriculture College, July 5 (L. G. Gentner).

MISSOURI: Central part, June, July (——).

NEW HAMPSHIRE: Hampton, June 18, 1901 (S. A. Shaw).

NEW YORK: Long Island (——). Albany, June 13, 1903 (——).

OHIO: Columbus, June–July (J. N. Knull).

PENNSYLVANIA: Hummelstown, reared June–July (J. N. Knull and H. B. Kirk).

SOUTH CAROLINA: Clemson College, May 22, 1926 (J. O. Pepper). Caesar Head, June 29, 1926 (F. Sherman).

SOUTH DAKOTA: No definite locality (F. M. Hull).

TEXAS: Montell, April 2, 1907 (W. F. Fiske). Zavalla County, April (Hunter and Pratt). Victoria, April 9, 1916 (J. D. Mitchell).

VIRGINIA: Dyke, May 28, 1920 (L. L. Buchanan). Pennington Gap, July (Hubbard and Schwarz).

WEST VIRGINIA: No definite locality.

Variations.—The color varies from brownish cupreous to bluish green, but is usually dark bronzy brown. The lateral margins and median depressions on the pronotum, the anterior margin of the prosternal lobe, and the length of the posterior tarsi are all more or less variable, and can not be used satisfactorily in this species. Length, 3.25 to 5.25 millimeters.

Host.—This species has been reared a number of times from dead branches of hackberry (*Celtis occidentalis* Linnaeus), and is common wherever its host plant occurs.

This is a perfectly good species, but so far, no valid characters have been found for separating the females of this species and *egenus* satisfactorily, although a large series of reared specimens of both species were available for study. The external characters in the males are also variable, but in *celti* the males have the sides of the genitalia nearly parallel to each other, and the species lives in hackberry, whereas in *egenus* the sides of the genitalia are strongly expanded near the apex, and the species lives in black locust.

115. AGRILUS EGENUS Gory

Figure 90

Agrilus egenus DEJEAN, Cat. Coleopt., ed. 2, 1833, p. 82; ed. 3, 1837, p. 93 (no description).—GORY, Mon. Bupr. Suppl., vol. 4, 1841, p. 258, pl. 43, fig. 251.—LECONTE, Proc. Acad. Nat. Sci. Phila., vol. 9, 1857, p. 9; Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, pp. 249–250; Smithsonian Misc. Coll., No. 167, 1863, p. 82.—GLOVER, Rept. U. S. Comm. Agric. for 1868 (1869), p. 92, fig. 103; Rept. U. S. Comm. Agric. for 1870 (1871), p. 67.—PETTIT, Canad. Ent., vol. 4, 1872, p. 99.—GLOVER, Illustrations N. Amer. Ent., Coleopt., 1878, pl. 23, fig. 7 (no text).—HUBBARD and SCHWARZ, Proc. Amer. Philos. Soc., vol. 17, 1878, pp. 636, 656.—HARRINGTON, Canad. Ent., vol. 15, 1883, p. 80 (probably *otiosus*); 14th Rept. Ent. Soc. Ontario for 1883 (1884), pp. 36, 45 (probably *otiosus*); Canad. Ent., vol. 16, 1884, p. 102 (probably *otiosus*); 15th Rept. Ent. Soc. Ontario for 1884 (1885), p. 31 (probably *otiosus*).—CHITTENDEN, Ent. Amer., vol. 5, 1889, pp. 219–220.—BLANCHARD, Ent. Amer., vol. 5, 1889, p. 32.—COOK, 29th Rept. Mich. Board Agric., 1890, p. 119 (probably *otiosus*).—PACKARD, 5th Rept. U. S. Ent. Comm., 1890, pp. 291, 372 (in part probably *otiosus*).—SCHWARZ, Proc. Ent. Soc. Wash., vol. 2, 1891, pp. 74–75.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, pp. 331–332, pl. 8, fig. 13 (part).—HOPKINS, Insect Life, vol. 4, 1892. p. 259 (this is *celti* Knull).—HAUSEN, Canad. Rec. Sci., vol. 5, 1892, p. 52.—HOPKINS, W. V. Agric. Exp. Sta., Bull. 32, 1893, pp. 184, 222, 223.—HAMILTON, Trans. Amer. Ent. Soc., vol. 22, 1895, p. 364.—EVANS, Canad. Ent., vol. 27, 1895, p. 146.—COCKERELL, New Mexico Agric. Exp. Sta., Bull. 28, 1898, p. 152.—SMITH, 27th Ann. Rept. N. J. State Board Agric. for 1899 (1900), suppl., p. 258.—CHITTENDEN, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67 (part).—MACGILLIVRAY and HOUGHTON, Ent. News, vol. 13, 1902, p. 251.—ULKE, Proc. U. S. Nat. Mus., vol. 25, No. 1275, 1902, p. 47.—OUELLET, Le Naturaliste Canadien, vol. 29, 1902, p. 120.—KNAUS, Ent. News, vol. 14, 1903, p. 176.—FELT, N. Y. State Mus., Mem. 8, vol. 2, 1906, pp. 715, 729 (part).—FALL and COCKERELL, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 181.—HOUGHTON, Canad. Ent., vol. 40, 1908, p. 162.—DAECKE, Ent. News, vol. 20, 1909, p. 330 (probably *otiosus*).—SMITH, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295.—BLATCHLEY, Coleoptera of Indiana, 1910, pp. 804–805, fig. 307.—BEAL, U. S. Dept. Agric., Biol. Survey, Bull. 44, 1912, p. 54.—MANEE, Ent. News, vol. 24, 1913, p. 171.—JOHNSON, Ent. News, vol. 26, 1915, p. 312.—GARMAN, Ky. State Forester, 2d Bien, Rept., 1915, pp. 52–53; Ky. Agric. Exp. Sta. Bull. 200, 1916, p. 124.—CHAGNON, 9th Rept. Quebec Soc. Protection Plants, suppl. pt. 3, 1917, p. 219.—NICOLAY, Bull. Brooklyn Ent. Soc., vol. 14, 1919, p. 19.—BRITTON, Conn. State Geol. and Nat. Hist. Survey, Bull. 31, 1920, p. 244.—ROSEWALL, Canad. Ent., vol. 52, 1920, p. 203.—FROST and WEISS, Canad. Ent., vol. 52, 1920, p. 223 (part).—KNULL, Ent. News, vol. 31, 1920, p. 11; Canad. Ent., vol. 54, 1922, p. 85.—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 8, pl. 1, fig. 11 (part).—CHAMPLAIN and KNULL, Ent. News, vol. 34, 1923, p. 85, fig. 2.—CHAPIN, U. S. Dept. Agric., Bull. 1355, 1925, p. 33.—KNULL, Ohio State Univ. Studies, vol. 2, no. 2, 1925, p. 52, pl. 1, figs. 4, 11.—CHAMBERLIN, Cat. Buprestidae, 1926, pp. 59–60.

Agrilus otiosus PACKARD (not Say), 5th Rept. U. S. Ent. Comm., 1890, p. 367.—SMITH, 27th Ann. Rept. N. J. State Board Agric. for 1899 (1900), suppl. p. 257 (part).—FELT, N. Y. State Mus., Mem. 8 vol. 2, 1906, pp. 502, 518, 729 (part).—SMITH, Ann. Rept. N. J. State Mus. for 1909 (1910), p. 295 (part).—FROST and WEISS, Canad. Ent., vol. 52, 1920, pp. 205–206 (part).—MUTCHLER and WEISS, N. J. Dept. Agric., Bur. Statistics and Inspection, Circ. 48, 1922, p. 9 (part).—FELT, 35th Rept. N. Y. State Ent. for 1921 (1923), p. 90 (part).

Agrilus politus LUGGER (not Say), Psyche, vol. 4, 1884, p. 203.—FELT, N. Y. State Mus., Mem. 8, vol. 2, 1906, pp. 729, 741 (part).

Male.—Form moderately elongate, feebly shining, uniformly brownish or greenish bronze, except the head, which is light green, with a slight aeneous tinge; beneath slightly more greenish and shining than above.

Head with the front rather wide, nearly flat, about equal in width at top and bottom, the lateral margins rather strongly, arcuately constricted at middle, and with a feeble, narrow longitudinal groove on the vertex and occiput; surface densely, coarsely granulose on the front, with numerous large punctures intermixed, becoming longitudinally rugose on the occiput, and sparsely clothed anteriorly with moderately long, recumbent, whitish hairs; epistoma rather wide between the antennae, and broadly, deeply, arcuately emarginate in front; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints longer than wide; eyes large, rather broadly oval, and more acutely rounded beneath than above.

Pronotum one-third wider than long, slightly narrower at base than at apex, and widest near the middle; sides nearly parallel or feebly, arcuately rounded to basal fourth, then feebly narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal carina is rather strongly sinuate, the submarginal carina straight or feebly sinuate, the two carinae not very widely separated anteriorly, and connected to each other at basal fourth; anterior margin strongly sinuate, with a broadly rounded median lobe; base transversely sinuate to middle of each elytron, with the median lobe feebly, broadly rounded, and subtruncate or feebly emarginate in front of scutellum; disk moderately convex, with one or two round, feeble depressions placed longitudinally on the median part, a large, deep depression on each side along lateral margin, and with strongly elevated, slightly oblique, prehumeral carinae, extending from base to near the middle; surface coarsely, transversely rugose, finely, densely granulose and with numerous fine punctures between the rugae. Scutellum transversely carinate, and the surface finely, densely reticulate.

Elytra wider than pronotum at base, and about equal in width at base and behind middle; sides parallel for a short distance behind base, broadly, feebly constricted near middle, broadly, arcuately expanded behind middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and finely serrulate; sides of abdomen narrowly exposed above; disk feebly longitudinally depressed along the sutural margins, which are strongly elevated posteriorly, and with broad, moderately deep basal depressions; surface rather coarsely imbricate-punctate, and clothed with a few short, inconspicuous, whitish hairs, which are more distinct in the basal depressions.

Abdomen beneath rather densely, finely punctate, becoming irregularly, transversely striolate toward the sides of basal segments, and sparsely, uniformly clothed with short, recumbent, whitish hairs; vertical portions of the segments slightly more densely pubescent than ventral surface; first and second segments broadly, but not deeply, longitudinally concave at middle, and the concavity rather densely clothed with long, semierect, whitish hairs, which point obliquely backward toward the median line of the concavity; pygidium with a smooth median line, but not carinate. Prosternum rather coarsely, sparsely granulose, and rather densely clothed with long, erect, inconspicuous hairs, which extend along the median part of body to the abdomen; prosternal lobe broad, slightly declivous, broadly rounded in front, and with a broad, feeble, arcuate emargination at the middle; prosternal process rather broad, the sides nearly parallel to behind the coxal cavities, then obliquely narrowed to the apex, which is obtusely rounded. Posterior coxae with the posterior margin nearly transversely truncate, or feebly sinuate, and the exterior angle rectangular, and not prolonged. Tibiae slender, the anterior and middle pairs slightly arcuate, and armed with a short tooth on inner margin at apex. Posterior tarsi about as long as the tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth long and acute, the inner tooth broad, about one-half as long as outer one, and not turned inward.

Female.—Differs from the male in having the front of head more bronzy green, the lateral margins nearly parallel, more sparsely punctured, and not quite so densely granulose and pubescent; prosternum more coarsely punctured, not clothed with long pubescence, and the prosternal lobe subtruncate in front; anterior and middle tibiae unarmed at apex; first two abdominal segments convex, and without long pubescence at middle, and the hind tarsi slightly shorter than the tibiae.

Length, 3.5–5.5 mm.; width 1–1.6 mm.

Type locality.—North America. Originally described from the Gory collection, but present location of type is unknown to writer.

Distribution.—This species has a wide distribution, being found in eastern Canada (Quebec, Ontario) and the eastern and southwestern part of the United States. Material has been examined from various localities in the following States: Arizona, Connecticut, District of Columbia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, Nebraska, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, West Virginia, and Wisconsin.

Variations.—Notwithstanding the wide area over which this species is distributed, there seems to be very little variation, except in size and color. The color varies from cupreous brown to olivaceous green, and all intermediate shades can be found in a large series of specimens. Some examples are slightly more robust than others, the pubescence on the upper surface is slightly more distinct, and the median depressions on the pronotum are usually distinct, but occasionally specimens are found in which the depressions are obsolete.

Hosts.—This species has been reared a number of times by different workers from black locust (*Robinia pseudoacacia* Linnaeus) which seems to be its common host plant. It has also been reared from the New Mexican locust (*Robinia neomexicana* Gray) by Hubbard and Schwarz. It has been recorded a number of times in the literature as having been reared from hickory (*Hicoria* sp.). but these records are probably from erroneously identified specimens, and should refer to *otiosus* Say. Frost and Weiss (1920) record it as having been reared from Virginia creeper (*Parthenocissus quinquefolia* (Linnaeus) Planchon) by H. B. Kirk, but this is probably only accidental.

This species is badly confused in nearly all of the collections, and the citations to it in the literature sometimes refer to other species, so great care should be used in citing any of the older records for this species. It has been frequently confused with *otiosus* Say, but it can be readily separated from that species by the structure of the antennae. In the group of species in which the serration of the antennae begins with the fifth joint, this species is very closely allied to *celti* Knull, and the females of these two species can not be separated satisfactorily, although the males are readily separated on the differences in the genitalia.

116. AGRILUS ABSTERSUS Horn

Figure 91

Agrilus abstersus Horn, Trans. Amer. Ent. Soc., vol. 18, 1891. p. 324.—Chittenden, U. S. Dept. Agric., Div. Ent., Bull. 22, new ser., 1900, p. 67.—Frost and Weiss, Canad. Ent., vol. 52, 1920, p. 222.—Chamberlin, Cat. Buprestidae, 1926, p. 47.

Male.—Form small, moderately elongate, subcylindrical, moderately shining and piceous, with a strong aeneous or greenish tinge; beneath slightly more shining than above.

Head with the front rather wide, strongly convex, slightly wider at top than at bottom, the lateral margins feebly, obliquely expanded from bottom to top, and without any trace of depressions; surface finely. obsoletely granulose, sparsely, feebly rugose or punctate, and sparsely clothed with rather long, recumbent, whitish hairs; epistoma rather narrow between the antennae, and broadly, rather deeply, arcuately emarginate in front; antennae extending to about middle of pronotum, serrate from the fifth joint, and the outer joints about as wide as long; eyes small, broadly oval, and equally rounded beneath and above.

Pronotum slightly wider than long and distinctly narrower at base than apex; sides nearly parallel or feebly arcuate from apical angles to basal third, then obliquely narrowed to the posterior angles, which are obtuse; when viewed from the side the marginal and submarginal carinae are nearly straight, rather widely separated anteriorly, and connected to each other behind the middle; anterior margin slightly sinuate, with a broadly rounded median lobe; base transversely bisinuate, with a broadly rounded median lobe, which is arcuately emarginate in front of scutellum; disk moderately convex, without median or lateral depressions, and without any trace of prehumeral carinae; surface obsoletely granulose, feebly, obliquely rugose, the rugae widely separated, and sparsely clothed with short, inconspicuous, recumbent, whitish hairs. Scutellum not transversely carinate, but the surface finely reticulate.

Elytra slightly wider than pronotum at base; sides nearly parallel to behind middle (arcuately constricted in front of middle), then obliquely narrowed to the tips, which are conjointly, very broadly rounded, and strongly serrulate; sides of abdomen scarcely visible from above; disk moderately convex, the sutural margins elevated posteriorly, with broad, shallow basal depressions, but without costae or longitudinal depressions along suture; surface coarsely imbricate-punctate and distinctly clothed with uniformly spaced, moderately long, recumbent silvery white hairs.

Abdomen beneath finely, transversely reticulate, the reticulation widely separated, and sparsely clothed with short, recumbent, silvery white hairs; vertical portions of segments not conspicuously pubescent; first segment with a short, smooth, median groove at the posterior margin; pygidium more or less longitudinally carinate, but the carina not projecting posteriorly. Prosternum sparsely, finely punctate, and sparsely clothed with long, erect, whitish hairs, which extend along the median part of the body to abdomen; prosternal lobe broad, strongly declivous, and subtruncate, or broadly, feebly emarginate in front; prosternal process rather broad, the sides nearly parallel to behind the coxal cavities, then arcuately attenuate to the apex, which is obtusely rounded. Posterior coxae with the posterior margin sinuate and the exterior angle not prolonged. Tibiae slender, the anterior pair slightly arcuate and the anterior and middle pairs armed with a rather long, arcuate tooth on the inner margin at apex. Posterior tarsi about as long as the tibiae and the first joint slightly longer than the second one. Tarsal claws dissimilar, the anterior claws cleft near the middle, the two teeth acute at tips, and nearly equal in length; middle and posterior claws cleft near middle, the inner tooth broad, about one-half as long as the outer tooth, and not turned inward.

Length, 3.75 mm.; width, 0.875 mm.

Female.—Differs from the male in having the front of head brownish cupreous and the surface not quite so densely pubescent; prosternum very sparsely punctured and without long pubescence; first abdominal segment convex, and not sulcate at middle, and the tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, shorter than outer one, and not turned inward.

Redescribed from the male lectotype, No. 3490, in the Philadelphia Academy of Natural Sciences.

Type locality.—Southern Arizona (no definite locality given).

DISTRIBUTION

Material examined:

ARIZONA: Hot Springs, June 27 (Barber and Schwarz). Santa Rita Mountains, May 17 (Hubbard and Schwarz). "Tanke Verde," reared (M. Chrisman). Also numerous specimens simply labeled "Arizona," collected by Morrison, and probably all from the type locality.

Variations.—Very little variation has been observed in the specimens examined except that some examples are slightly more bronzy green than others, and the length varies from 3 to 4 millimeters.

Host.—This species has been reared by Hubbard and Schwarz, and also by Chrisman, from the twigs of catclaw (*Acacia greggii* Gray).

This species resembles *Taphrocerus agriloides* Crotch very closely, and is allied to *Agrilus putillus* Say, from which it can be readily separated by the elytra not being costate, the eyes broadly rounded beneath, and the scutellum not transversely carinate.

117. AGRILUS PUTILLUS Say

Figure 92

Agrilus putillus SAY, Trans. Amer. Philos. Soc., vol. 6, new ser., 1836, p. 163.—LECONTE, Trans. Amer. Philos. Soc., vol. 11, new ser., 1859, p. 250; Say's Writings, vol. 2, p. 579 (Baillière Bros. ed., 1859; Cassino and Co. ed., 1883).—CROTCH, Proc. Acad. Nat. Sci. Phila., vol. 25, 1873, p. 96.—HUBBARD and SCHWARZ, Proc. Amer. Philos. Soc., vol. 17, 1878, p. 656.—HARRINGTON, Canad. Ent., vol. 16. 1884, p. 71.—HORN, Trans. Amer. Ent. Soc., vol. 18, 1891, p. 323.—BLATCHLEY. Coleoptera of Indiana, 1910, p. 804.—NICOLAY and WEISS, Journ. N. Y. Ent. Soc., vol. 28, 1920, p. 145.—KNULL, Canad. Ent., vol. 54, 1922, p. 85; Ohio State Univ. Studies, vol. 2, no. 2, 1925, pp. 50–51.—CHAMBERLIN, Cat. Buprestidae. 1926, p. 79.

Male.—Form small and robust, moderately shining, and piceous, with a more or less distinct aeneous tinge, except the head, which is dark bronzy green in front; beneath similar in color, but slightly more shining than above.

Head with the front rather wide, about equal in width at top and bottom, the lateral margins vaguely, broadly, arcuately constricted at middle, and with a broad, feeble, longitudinal groove on the occiput; surface densely, finely granulose, feebly transversely rugose on the front, becoming longitudinally rugose on the occiput, and rather densely clothed anteriorly with long, recumbent, silvery white hairs; epistoma slightly transverse between the antennae, and broadly, rather deeply, arcuately emarginate in front; antennae extending about to middle of pronotum, serrate from the fifth joint, and the outer joints not wider than long; eyes rather broadly oval, and distinctly more acutely rounded beneath than above.

Pronotum two-thirds wider than long, slightly narrower at base than apex, and widest along apical half; sides nearly parallel and slightly sinuate from apical angles to basal third, then obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are feebly sinuate, not very widely separated anteriorly, and connected to each other behind the middle; anterior margin nearly transversely truncate and the median lobe only feebly indicated; base transversely bisinuate, the median lobe feebly, broadly rounded, and subtruncate in front of scutellum; disk moderately convex, with a broad, shallow, transverse depression behind the middle, with a large, deep depression on each side along lateral margin at middle, and without prehumeral carinae; surface coarsely, transversely rugose, and with numerous fine punctures between the rugae. Scutellum strongly, transversely carinate, and the surface densely, finely reticulate.

Elytra only feebly wider at base than pronotum; sides nearly parallel to behind the middle, where they are arcuately expanded and distinctly wider than at base, then obliquely narrowed to the tips, which are separately, rather broadly rounded and obsoletely serrulate; sides of abdomen not visible from above; disk feebly, longitudinally depressed along the sutural margins, with broad, shallow basal depressions, and a more or less distinct longitudinal costa on each elytron; surface coarsely but not closely imbricate-punctate and clothed with a few short, very indistinct, hairs.

Abdomen beneath finely, sparsely punctate, feebly alutaceous, and very sparsely clothed with short, recumbent, whitish hairs; first and second segments convex at middle and without long pubescence; vertical portions of the segments not conspicuously pubescent; pygidium not carinate. Prosternum sparsely, finely punctate, obsoletely granulose, and sparsely clothed with long, erect, whitish hairs; prosternal lobe broad, strongly declivous, and broadly, arcuately emarginate in front; prosternal process rather broad, the sides slightly expanded behind the coxal cavities, then strongly narrowed to the apex, which is acute. Posterior coxae with the posterior margin slightly arcuately emarginate and the exterior angle feebly prolonged. Tibiae slender, straight, and the anterior and middle pairs armed with a very small tooth on the inner margin at apex. Posterior tarsi distinctly shorter than the tibiae, and the first joint as long as the following two joints united. Tarsal claws similar on all feet, cleft near the middle, the outer tooth long and acute, the inner tooth broad, about one-half as long as the outer one, and not turned inward.

Length, 4 mm.; width, 1.125 mm.

Female.—Differs from the male in having the head uniformly brownish cupreous, lateral margins more parallel, and the surface not quite so strongly granulose, and scarcely pubescent behind the epistoma; abdomen slightly visible from above, the prosternum not clothed with long, erect hairs, and the tibiae unarmed at apex.

Redescribed from a male collected by Hubbard and Schwarz, at Detroit, Mich., and now in the United States National Museum collection. Since the type of this species has been lost, I am designating the male from which the above description was made as the neotype.

Type locality.—Indiana (Posey County).

DISTRIBUTION

Material examined:

ALABAMA: Hazen, April 25, 1923 (L. B. Woodruff).
CANADA: Ottawa, July 1 (——). Prince Edward County, August 1, 1920 (Brimley).
ILLINOIS: No definite locality.
INDIANA: Lafayette, June 16 (——).
MASSACHUSETTS: Lenox (——).
MICHIGAN: Detroit, June; Grand Ledge (Hubbard and Schwarz).
NEW YORK: Olcott, June–August (H. Dietrich). Fishkill, July 7, 1916 (E. R. Kalmback).
PENNSYLVANIA: Jeannette, June (H. G. Klages). Hummelstown, June 17; Charter Oak, June 22 (J. N. Knull).
VERMONT: Bennington County (——).
It has been recorded from Ohio, but no specimens have been examined from that State.

Variations.—The color is rather constant, but some examples are slightly more cupreous than others. In some specimens the pronotum is widest at the middle, and the sides are regularly, arcuately rounded, whereas in others, the sides are nearly parallel to each other from the apical angles to basal third, then obliquely narrowed to the posterior angles. The discal costae on the elytra vary considerably in distinctness, and are sometimes nearly absent. In the neotype there are two small round depressions placed transversely at middle of pronotum, which are not mentioned in the above description, as they are probably abnormal and were not seen on any of the other specimens. Length, 3.5 to 4.5 millimeters.

Host.—The larval habits of this species are not known, but the adults have been collected in numbers by L. B. Woodruff in Alabama, on sugar maple (*Acer saccharum* Marshall).

118. AGRILUS OBLONGUS, new species

Figure 93

Male.—Form small, strongly elongate, slightly flattened above, and feebly shining; head bright green in front, becoming bronzy green on the occiput; pronotum bronzy green; elytra piceous; beneath bronzy green, with a slight cupreous tinge, and more shining than above.

Head with the front rather wide, nearly flat, about equal in width at top and bottom, the sides broadly, arcuately expanded above the middle, and without a median depression; surface densely, finely granulose, more or less rugose, and with only a few indistinct hairs behind the epistoma; epistoma slightly transverse between the antennae, broadly, deeply, arcuately emarginate in front, and the clypeal suture indistinct; antennae extending to middle of pronotum, serrate from the fifth joint, and the outer joints as wide as long; eyes large, broadly oval, and about equally rounded above and beneath.

Pronotum slightly wider than long, wider at apex than base, and widest near apical third; sides feebly, arcuately rounded from apical angles to behind middle, then obliquely narrowed to the posterior angles, which are rectangular; when viewed from the side the marginal and submarginal carinae are slightly sinuate, narrowly separated anteriorly, and connected to each other at base; anterior margin strongly sinuate, and the median lobe broadly rounded; base slightly emarginate at middle of each elytron, and the median lobe broadly rounded and feebly produced; disk moderately convex, broadly, transversely concave posteriorly, the concavity extending forward along the lateral margins, but without median depressions or prehumeral carinae; surface finely, transversely rugose, finely, sparsely punctate between the rugae, and without distinct pubescence. Scutellum strongly, transversely carinate, and the surface finely, densely reticulate.

Elytra slightly wider than pronotum at base, and equal in width at base and apical third; sides feebly expanded for a short distance behind base, broadly constricted in front of middle, broadly, arcuately expanded behind the middle, then obliquely narrowed to the tips, which are separately, rather broadly rounded, and strongly serrulate; sides of abdomen narrowly exposed above; disk slightly flattened, feebly, broadly depressed along the sutural margins, which are slightly elevated posteriorly, and with broad, moderately deep basal depressions; surface finely, densely imbricate-punctate, and nearly glabrous.

Abdomen beneath finely, sparsely punctate, the punctures connected transversely by sinuate lines, which are coarser on the basal segment, and sparsely clothed with inconspicuous hairs; first segment vaguely flattened at middle; vertical portions of segments not conspicuously pubescent; pygidium without a projecting carina. Prosternum finely, sparsely punctate, and sparsely clothed with short, recumbent, whitish hairs; prosternal lobe broad, feebly declivous, and broadly rounded in front; prosternal process rather broad, the sides slightly expanded behind the coxal cavities, then abruptly narrowed to the apex, which is acute. Posterior coxae with the posterior margin nearly transversely truncate, the exterior angle rectangular, and not prolonged. Tibiae slender, straight, and the anterior and middle pairs with a small tooth on inner margin at apex. Posterior tarsi slightly shorter than the tibiae, and the first joint as long as the following three joints united. Tarsal claws similar on all feet, cleft near the middle, the inner tooth broad, much shorter than the outer one, and not turned inward.

Length, 4.75 mm.; width, 1.125 mm.

Female.—Unknown.

Type locality.—Chesapeake Beach, Md.

Other locality.—Chain Bridge, Va.

Type and paratypes.—Cat. No. 41017, U.S.N.M.

Described from three males (one type). Type and one paratype collected at the type locality, July 12, 1918, by Joseph Wrenn and H. S. Barber, and the other paratype collected at Chain Bridge, Va., June 5, 1920, by J. C. Bridwell.

This species is closely allied to *putillus* Say, but differs from that species in being more elongate and subcylindrical, the eyes broadly rounded beneath, and the prosternal lobe broadly rounded in front.

119. AGRILUS PRAEPOLITUS Wickham

Agrilus praepolitus WICKHAM, Bull. Mus. Comp. Zoöl., vol. 58, 1914, pp. 442–443, pl. 3, fig. 7.

This fossil species was described from a small specimen collected in the Miocene shales at Florissant, Colo., and so far is the only fossil form of this genus recorded from North America. Wickham states that in comparing it with *Agrilus politus*, the two forms are so nearly identical, that they can only be separated with difficulty. It is just possible that *Agrilus praepolitus* infested the willows of the ancient lake shore. Type No. 2485 in the Museum of Comparative Zoölogy (No. 5359, Scudder Collection).

AGRILUS VIRIDIFRONS LeConte

Agrilus viridifrons PROVANCHER, Petite Faune Entomologique du Canada, vol. 1, 1877, Les Coleopteres, p. 360.

This species belongs to the genus *Anthaxia*, but Provancher has erroneously placed it in the genus *Agrilus* in the paper listed above.

AGRILUS FULGIDICOLLIS Dejean

Agrilus fulgidicollis DEJEAN, Cat. Coleopt., ed. 2, 1833, p. 82; ed. 3, 1837, p. 93.

This species was listed by Dejean in his Catalogue from North America, without giving any description, but Kerremans[7] places it as a synonym of *thoracicus* described by Castelnau and Gory[8] from Chile. This species is unknown to the writer, and if Kerremans's opinion is correct the specimen in the Dejean collection is probably erroneously labeled as to locality.

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[7] Mem. Soc. Ent. Belg., No. 1, 1892, p. 275.

AGRILUS UMBRATUS Harold

Agrilus umbratus HAROLD, Coleopt. Heft, vol. 5, 1869, p. 124 (new name for *tenuis* Gory).—GEMMINGER and HAROLD, Cat. Coleopterorum, vol. 5, 1869, p. 1446.—KERREMANS, Mem. Soc. Ent. Belg., no. 1, 1892, p. 276; Wytsman's Gen. Insectorum, fasc. 12, pt. 4, 1903, p. 268.—CHAMBERLIN Cat. Buprestidae, 1926, p. 84.

Agrilus tenuis GORY (not Ratzeburg), Mon. Bupr. Suppl., vol. 4, 1841, p. 266, pl. 44, fig. 260 (name preoccupied).

This species should not be included in our North American lists. *Agrilus tenuis* was described by Gory (1841) from South America, but since this name was preoccupied, Harold (1869) renamed it *umbratus*. Kerremans (1892) records the locality as South America, but in his Genera Insectorum (1903) gives the United States as the only locality, which is without any doubt a typographical error.

AGRILUS SUBALTEATA LeConte

Agrilus subalteata (LeConte) CHAMBERLIN, Cat. Buprestidae, 1926, p. 82.

Chamberlin includes this species among the *Agrilus* in the above catalogue, which is an error, as it was described from Cape San Lucas, Lower California, and belongs to the genus *Acmaeodera*.

AGRILUS 14-SPILOTA Obenberger

Agrilus 14-spilota (Obenberger) CHAMBERLIN, Cat. Buprestidae, 1926, p. 79.

Chamberlin also includes this species among the *Agrilus*, which is an error. It was described from North America, but belongs to the genus *Acmaeodera*.

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[8] Mon. Bupr., vol. 2, 1837, *Agrilus* pp. 58–59, pl. 13, fig. 76.

EXPLANATION OF PLATES

The drawings accompanying this paper were made under the author's supervision by Miss Eleanor T. Armstrong, of the Bureau of Entomology. The drawings of the male genitalia were all made to the same scale.

a=dorsal view of the male genitalia.

b=ventral view of the male genitalia.

PLATE 1

FIG. 1. *Agrilus ferrisi* Dury.
2. *Agrilus subtropicus* Schaeffer.
3. *Agrilus champlaini* Frost.
4. *Agrilus ruficollis* (Fabricius).
5. *Agrilus lateralis* (Say).
6. *Agrilus obtusus* Horn.
7. *Agrilus difficilis* Gory.
8. *Agrilus cupricollis* Gory.
9. *Agrilus fuscipennis* Gory.

PLATE 2

FIG. 10. *Agrilus angelicus* Horn.
11. *Agrilus masculinus* Horn.
12. *Agrilus paramasculinus* Champlain and Knull.
13. *Agrilus arcuatus* (Say).
14. *Agrilus crinicornis* Horn.
15. *Agrilus defectus* LeConte.
16. *Agrilus geminatus* (Say).
17. *Agrilus otiosus* Say.
18. *Agrilus atricornis* Fisher.

PLATE 3

FIG. 19. *Agrilus transimpressus* Fall.
20. *Agrilus frosti* Knull.
21. *Agrilus juglandis* Knull.
22. *Agrilus macer* LeConte.
23. *Agrilus pulchellus* Bland.
24. *Agrilus vittaticollis* Randall.
25. *Agrilus benjamini* Fisher.
26. *Agrilus audax* Horn.
27. *Agrilus bilineatus* (Weber).

Plate 4

Fig. 28. *Agrilus quercicola* Fisher.
29. *Agrilus criddlei* Frost.
30. *Agrilus acutipennis* Mannerheim.
31. *Agrilus quadriguttatus* Gory.
32. *Agrilus niveiventris* Horn.
33. *Agrilus fulminans* Fisher.
34. *Agrilus populi* Fisher.
35. *Agrilus anxius* Gory.
36. *Agrilus cavatus* Chevrolat.

Plate 5

Fig. 37. *Agrilus aureus* Chevrolat.
38. *Agrilus concinnus* Horn.
39. *Agrilus walsinghami* Crotch.
40. *Agrilus restrictus* Waterhouse.
41. *Agrilus costipennis* Fisher.
42. *Agrilus baboquivariae* Fisher.
43. *Agrilus huachucae* Schaeffer.
44. *Agrilus obolinus* LeConte.
45. *Agrilus fallax* Say.

Plate 6

Fig. 46. *Agrilus scitulus* Horn.
47. *Agrilus obsoletoguttatus* Gory.
48. *Agrilus lautuellus* Fisher.
49. *Agrilus ornatulus* Horn.
50. *Agrilus dozieri* Fisher.
51. *Agrilus fagi* (Ratzeburg).
52. *Agrilus politus* (Say).
53. *Agrilus sinuatus* (Olivier).
54. *Agrilus coeruleus* (Rossi).

Plate 7

Fig. 55. *Agrilus crataegi* Frost.
56. *Agrilus cephalicus* LeConte.
57. *Agrilus strigicollis* Fall.
58. *Agrilus gibbicollis* Fall.
59. *Agrilus olentangyi* Champlain and Knull.
60. *Agrilus chiricahuae* Fisher.
61. *Agrilus aeneocephalus* Fisher.
62. *Agrilus malvastri* Fisher.
63. *Agrilus falli* Fisher.

Plate 8

Fig. 64. *Agrilus illectus* Fall.
65. *Agrilus felix* Horn.
66. *Agrilus jacobinus* Horn.
67. *Agrilus impexus* Horn.
68. *Agrilus cupreonitens* Fisher.
69. *Agrilus quercus* Schaeffer.
70. *Agrilus palmacollis* Horn.
71. *Agrilus prosopidis* Fisher.
72. *Agrilus exiguellus* Fisher.

Plate 9

Fig. 73. *Agrilus acaciae* Fisher.
74. *Agrilus abductus* Horn.
75. *Agrilus pseudofallax* Frost.
76. *Agrilus egeniformis* Champlain and Knull.
77. *Agrilus dolli* Schaeffer.
78. *Agrilus lecontei* Saunders.
79. *Agrilus abjectus* Horn.
80. *Agrilus blandus* Horn.
81. *Agrilus subcinctus* Gory.

Plate 10

Fig. 82. *Agrilus muticus* LeConte.
83. *Agrilus lacustris* LeConte.
84. *Agrilus imbellis* Crotch.
85. *Agrilus barberi* Fisher.
86. *Agrilus abditus* Horn.
87. *Agrilus pusillus* (Say).

Plate 11

Fig. 88. *Agrilus eleanorae* Fisher.
89. *Agrilus celti* Knull.
90. *Agrilus egenus* Gory.
91. *Agrilus abstersus* Horn.
92. *Agrilus putillus* Say.
93. *Agrilus oblongus* Fisher.

INDEX

This index includes all genera, species, subspecies, and varieties of insects referred to in this paper. The references to the descriptions appear in **boldface** type, valid names in roman, and synonyms in *italics*. The generic name associated with species and varietal names is given in brackets. The names of the host plants mentioned in this paper are indexed separately.

Page

- abditus Horn [Agrilus] 17, 253, 255, 313
- abductus Horn [Agrilus] 16, 279, 281
- abjectus Horn [Agrilus] 16, 267, 270, 295, 299
- abstersus Horn [Agrilus] 17, 329
- acaciae new species [Agrilus] 16, 279
- Acmaeodera Eschscholtz 182, 336
  - quatuordecim-spilota Obenberger 336
  - subalteata LeConte 336
- acutipennis Mannerheim [Agrilus] 11, 120, 122, 124, 126, 127, 131, 133, 134, 135, 221, 224
- addendus Crotch [Agrilus] 15, 267, 284, 287, 297
- *advena* LeConte [Agrilus] 308
- aeneocephalus new species [Agrilus] 14, 15, 245
- AGRILINI 2
- agriloides Crotch [Taphrocerus] 190, 331
- Agrilus Curtis. 2, 7, 34, 50, 64, 75, 104, 118, 219, 221, 229
  - abditus Horn 17, 253, 255, 313
  - abductus Horn 16, 279, 281
  - abjectus Horn 16, 267, 270, 295, 299
  - abstersus Horn 17, 329
  - acaciae new species 16, 279
  - acutipennis Mannerheim 11, 120, 122, 124, 126, 127, 131, 133, 134, 135, 221, 224
  - addendus Crotch 15, 267, 284, 287, 297
  - *advena* LeConte 308
  - aeneocephalus new species 14, 15, 245
  - albocomus new species 9, 59
  - aleus Gory 141
  - *amabilus* Castelnau and Gory 224, 226
  - angelicus Horn 9, 13, 52, 53, 67, 214
  - anxius Gory 12, 114, 124, 138, 153, 154, 155, 156, 157, 158, 160, 221, 224
  - arbuti new species 9, 13, 50
  - arcuatus (Say) 7, 9, 42, 44, 53, 56, 59, 60, 61, 63, 68, 69, 70, 71, 72, 164, 214
  - *assimilis* Sturm 79
  - ater Blanchard 160
  - atricornis new species 9, 86
  - audax Horn 10, 107, 109, 209
  - aureus Chevrolat 12, 168
  - auricomus Frost 11, 130
  - auroguttatus Schaeffer 11, 135
  - *aurolineatus* Gory 116, 118
  - *azureus* Knull (variety of bilineatus Weber) 119
  - baboquivariae new species 12, 184, 193
  - barberi new species 17, 311
  - benjamini new species 10, 107, 111
  - betulae new species 11, 153
  - biguttatus Gory 141
- Agrilus Curtis bilineatus (Weber) 10, 113, 119, 162, 207
  - *bivittatus* Kirby 116, 118
  - *blanchardi* Horn 158, 159, 160
  - blandus Horn 16, 297
  - burkei Fisher (subspecies of politus Say) 218, 219
  - *canadensis* Obenberger 214, 216, 217, 219
  - carpini Knull (subspecies of bilineatus Weber) 10, 115, 118, 119
  - cavatus Chevrolat 12, 166, 178
  - celti Knull 17, 317, 320, 322, 325, 329
  - celticola (new subspecies of lecontei Saunders) 16, 294
  - cephalicus LeConte 14, 82, 229
  - champlaini Frost 8, 27, 82
  - chiricahuae new species 14, 243, 320
  - chryseis Curtis 220, 223
  - coeruleus (Rossi) 13, 224
  - communis Obenberger 209
  - concinnus Horn 12, 168, 171, 175
  - *coryli* Horn 64, 68, 71, 218
  - corylicola new name 71
  - *corylus* Gibson (variety of politus Say). 214, 218
  - costipennis new species. 12, 182, 184, 186, 190, 193
  - *couesii* LeConte 169, 170, 171
  - crataegi Frost 13, 226
  - criddlei Frost 10, 122, 126
  - crinicornis Horn 9, 72
  - *cuneus* LeConte 305, 307, 308
  - *cupreolus* LeConte 214, 216, 217
  - cupreomaculatus Dugès 8, 44
  - cupreonitens new species 15, 16, 265
  - cupricollis Gory 8, 42, 63, 64, 66, 67
  - *cyanescens* (Ratzeburg) 224, 226
  - *cyaneus* Castlenau and Gory 224, 226
  - defectus LeConte 9, 75, 82
  - *desertus* LeConte 214, 216, 217
  - difficilis Gory 8, 9, 39
  - dolli Schaeffer 16, 289
  - dozieri Fisher 13, 207
  - egeniformis Champlain and Knull 16, 262, 267, 284, 286
  - egenus Gory 7, 17, 82, 97, 98, 213, 231, 232, 287, 311, 313, 320, 322, 325
  - eleanorae new species 17, 320
  - exiguellus new species 15, 277
  - fagi (Ratzeburg) 13, 209, 214
  - fallax Say 13, 193, 196, 199, 284, 286
  - falli new species 14, 249

Page
Agrilus Curtis felix Horn 15, 255
  ferrisi Dury 8, 18
  flavolineatus Dejean 113, 118
  floridanus Crotch 15, 260
  frenatus Dejean 104
  frosti Knull 10, 82, 90, 96
  fulgens LeConte (subspecies of arcuatus Say) 64, 66, 68, 71
  fulgidicollis Dejean 335
  fulminans new species 11, 148, 153
  fuscipennis Gory 8, 44, 46, 107
  geminatus (Say) 9, 78
  gibbicollis Fall 14, 16, 234
  granulatus (Say) 11, 111, 113, 138, 142, 144, 145
  gravis LeConte 162, 164, 165, 166
  horni Kerremans 12, 158
  huachucae Schaeffer 12, 186
  illectus Fall 15, 251, 255
  imbellis Crotch 17, 307, 308, 313, 315
  impexus Horn 15, 262, 265, 269, 270, 284, 287, 297
  impressipennis Uhler 194, 196
  ineptus Horn 178
  inhabilis Kerremans 12, 178
  interruptus LeConte 199, 201, 202
  jacobinus Horn 15, 251, 253, 257, 258
  juglandis Knull 10, 93, 97, 98
  knausi Schaeffer 190, 192
  lacustris LeConte 17, 78, 234, 241, 305, 310, 311
  latebrus Castelnau and Gory 127, 129
  lateralis (Say) 8, 34
  lautuellus new species 13, 202, 207
  lecontei Saunders 15, 16, 272, 284, 289, 291
  lucanus Fall 8, 25
  macer LeConte 10, 98
  malvastri new species 14, 247
  masculinus Horn 9, 56, 61, 63, 94
  mercurius Wickham 234, 236, 237
  mimosae new species 14, 241
  muticus LeConte 16, 302
  nevadensis Horn 8, 10, 11, 20
  nigricans Dejean 199, 201, 202
  niveiventris Horn 11, 145, 148, 149, 150, 153, 214
  obliquus LeConte 64, 66, 68, 69, 70
  oblongus new species 18, 333
  obolinus LeConte 12, 190
  obsoletoguttatus Gory 13, 196, 199
  obtusus Horn 8, 37
  occidentalis Uhler 39, 41
  olentangyi Champlain and Knull 14, 17, 239, 317
  olivaceoniger new species 11, 124, 127, 133
  ornatulus Horn 13, 202, 204, 205
  otiosus Say 7, 9, 27, 56, 75, 78, 79, 81, 88, 91, 93, 96, 98, 229, 232, 320, 325, 326, 329
  palmacollis Horn 15, 272, 277
  palmaticollis Kerremans 272
  paramasculinus Champlain and Knull 9, 61
  parvus Saunders 318, 320
  pensus Horn 11, 155
  perlucidus Gory 171
  pilosicollis new species 10, 111
  pinalicus Wickham 101, 103
  plumbeus LeConte 214, 216, 217
  politus (Say) 7, 13, 53, 56, 72, 145, 193, 210, 212, 213, 218, 219, 226, 227, 326, 335
  populi new species 11, 22, 145, 148, 150

Page
Agrilus Curtis praepolitus Wickham 335
  prosopidis new species 15, 274, 275
  pseudocoryli new subspecies of politus Say 71, 72, 214, 218
  pseudofallax Frost 16, 262, 265, 267, 269, 284, 289
  pubescens new species 17, 315
  pubifrons new species 14, 237
  pubiventris Crotch 305, 307, 308
  pulchellus Bland 3, 6, 10, 12, 101, 179, 180
  puncticeps LeConte 10, 96
  pusillus (Say) 17, 317, 320
  putillus Say 18, 331, 335
  quadriguttatus Gory 11, 138, 140, 141
  quadriimpressus Ziegler 11, 120, 124, 132, 133
  quatuordecim-spilota (14-spilota) Obenberger 336
  quercicola new species 10, 120, 127, 130
  quercus Schaeffer 15, 16, 270, 284
  restrictus Waterhouse 12, 173, 188
  rubicola Abeille (aberration of communis Obenberger) 209
  rubrovittatus (Waterhouse) 3
  ruficollis (Fabricius) 8, 29, 34, 37, 42, 44, 318, 320
  sayi Saunders 34
  scitulus Horn 13, 196
  sierrae VanDyke 15, 17, 253, 315
  sinuatus (Olivier) 13, 127, 160, 220
  snowl Fall 12, 180
  solitarius Harold 214
  strigicollis Fall 14, 232
  subaeratus Harris 199, 202
  subalteata LeConte 336
  subcinctus Gory 16, 299
  subfasciatus LeConte 291, 293, 294
  subtropicus Schaeffer 8, 22, 26
  sulcaticeps Abeille 224, 226
  tenuis Gory 336
  texanus Crotch 166, 168
  thoracicus Castelnau and Gory 336
  torpidus LeConte 162, 164, 165, 166
  torquatus LeConte (subspecies of arcuatus Say) 64, 66, 68, 69
  townsendi Fall 9, 13, 48
  transimpressus Fall 9, 88
  trivittatus Horn 116
  umbratus Harold 336
  ventralis Horn 12, 188
  virens Gory 82
  virescens Dejean 81
  viridifrons LeConte 335
  viridis Linnaeus 2, 209, 210, 212
  vittaticollis (Randall) 10, 104, 107, 109, 111, 207, 209
  walsinghami Crotch 12, 175, 176, 182, 184
  zemes Gory 194, 196
albocomus new species [Agrilus] 9, 59
aleus Gory [Agrilus] 141
amabilis Castelnau and Gory [Agrilus] 224, 226
angelicus Horn [Agrilus] 9, 13, 52, 53, 67, 214
Anthaxia Eschscholtz 190, 335
  virldifrons LeConte 335
anxius Gory [Agrilus] 12, 114, 124, 138, 153, 154, 155, 156, 157, 158, 160, 221, 224
arbuti new species [Agrilus] 9, 13, 50
arcuata Say [Buprestis] 63

Page
arcuatus (Say) [Agrilus] 7, 9, 42, 44, 53, 56, 59, 60, 61, 63, 68, 69, 70, 71, 72, 164, 214
assimilis Sturm [Agrilus] 79
ater Blanchard [Agrilus] 160
atricornis new species [Agrilus] 9, 86
audax Horn [Agrilus] 10, 107, 109, 209
aureus Chevrolat [Agrilus] 12, 168
auricomus Frost [Agrilus] 11, 130
auroguttatus Schaeffer [Agrilus] 11, 135
aurolineatus Gory [Agrilus] 116, 118
azureus Knull [Agrilus] (variety of bilineatus Weber) 119
baboquivariae new species [Agrilus] 12, 184, 193
barberi new species [Agrilus] 17, 311
benjamini new species [Agrilus] 10, 107, 111
betulae new species [Agrilus] 11, 153
biguttatus Gory [Agrilus] 141
bilineata Weber [Buprestis] 113
bilineatus (Weber) [Agrilus] 10, 113, 119, 162, 207
bivittatus Kirby [Agrilus] 116, 118
blanchardi Horn [Agrilus] 158, 159, 160
blandus Horn [Agrilus] 16, 297
Bronze birch borer 165
Buprestidae 2, 7, 210
Buprestis Linnaeus 2, 3, 29, 34, 63, 78, 104, 113, 138, 209, 213, 220, 224, 317
  arcuata Say 63
  bilineata Weber 113
  coeruleus Rossi 224
  cyanescens Ratzeburg 224
  fagi Ratzeburg 209
  geminata Say 78
  granulata Say 3, 138
  innuba Fabricius 3
  lateralis Say 34
  polita Say 213
  pusilla Say 317
  ruficollis Fabricius 3, 29
  sinuata Olivier 220
  viridis Linnaeus 2, 78, 81, 209
  vittaticollis Randall 104
burkei Fisher (subspecies of politus Say) [Agrilus] 218, 219
canadensis Obenberger [Agrilus] 214, 216, 217, 219
carpini Knull (subspecies of bilineatus Weber) [Agrilus] 10, 115, 118, 119
cavatus Chevrolat [Agrilus] 12, 166, 178
celti Knull [Agrilus] 17, 317, 320, 322, 325, 329
celticola new subspecies of lecontei Saunders [Agrilus] 16, 294
cephalicus LeConte [Agrilus] 14, 82, 229
champlaini Frost [Agrilus] 8, 27, 82
chiricahuae new species [Agrilus] 14, 243, 320
chryseis Curtis [Agrilus] 220, 223
coeruleus (Rossi) [Agrilus] 13, 224
coeruleus Rossi [Buprestis] 224
communis Obenberger [Agrilus] 209
concinnus Horn [Agrilus] 12, 168, 171, 175
coryli Horn [Agrilus] 64, 68, 71, 218
corylicola new name 71
corylus Gibson (variety of politus Say) [Agrilus] 214, 218
costipennis new species [Agrilus] 12, 182, 184, 186, 190, 193
couesii LeConte [Agrilus] 169, 170, 171
crataegi Frost [Agrilus] 13, 226

Page
criddlei Frost [Agrilus] 10, 122, 126
crinicornis Horn [Agrilus] 9, 72
cuneus LeConte [Agrilus] 305, 307, 308
cupreolus LeConte [Agrilus] 214, 216, 217
cupreomaculatus Dugès [Agrilus] 8, 44
cupreonitens new species [Agrilus] 15, 16, 265
cupricollis Gory [Agrilus] 8, 42, 63, 64, 66, 67
cyanescens (Ratzeburg) [Agrilus] 224, 226
cyanescens Ratzeburg [Buprestis] 224
cyaneus Castelnau and Gory [Agrilus] 224, 226
defectus LeConte [Agrilus] 9, 75, 82
desertus LeConte [Agrilus] 214, 216, 217
difficilis Gory [Agrilus] 8, 9, 39
dolli Schaeffer [Agrilus] 16, 289
dozieri Fisher [Agrilus] 13, 207
egeniformis Champlain and Knull [Agrilus] 16, 262, 267, 284, 286
egenus Gory [Agrilus] 7, 17, 82, 97, 98, 213, 231, 232, 287, 311, 313, 320, 322, 325
Elateridae 7
eleanorae new species [Agrilus] 17, 320
Engyaulus Waterhouse 3, 104, 180
  pulchellus (Bland) 3, 101.
  rubrovittatus Waterhouse 3
exiguellus new species [Agrilus] 15, 277
fagi (Ratzeburg) [Agrilus] 13, 209, 214
fagi Ratzeburg [Buprestis] 209
fallax Say [Agrilus] 13, 193, 196, 199, 284, 286
falli new species [Agrilus] 14, 249
felix Horn [Agrilus] 15, 255
ferrisi Dury [Agrilus] 8, 18
flavolineatus Dejean [Agrilus] 113, 118
floridanus Crotch [Agrilus] 15, 260
frenatus Dejean [Agrilus] 104
frosti Knull [Agrilus] 10, 82, 90, 96
fulgens LeConte (subspecies of arcuatus Say) [Agrilus] 64, 66, 68, 71
fulgidicollis Dejean [Agrilus] 335
fulminans new species [Agrilus] 11, 148, 153
fuscipennis Gory [Agrilus] 8, 44, 46, 107
geminata Say [Buprestis] 78
geminatus (Say) [Agrilus] 9, 78
gibbicollis Fall [Agrilus] 14, 16, 234
granulata Say [Buprestis] 3, 138
granulata (Say) [Teres] 138
granulatus (Say) [Agrilus] 11, 111, 113, 138, 142, 144, 145
gravis LeConte [Agrilus] 162, 164, 165, 166
horni Kerremans [Agrilus] 12, 158
huachucae Schaeffer [Agrilus] 12, 186
illectus Fall [Agrilus] 15, 251, 255
imbellis Crotch [Agrilus] 17, 307, 308, 313, 315
impexus Horn [Agrilus] 15, 262, 265, 269, 270, 284, 287, 297
impressipennis Uhler [Agrilus] 194, 196
ineptus Horn [Agrilus] 178
inhabilis Kerremans [Agrilus] 12, 178
innuba Fabricius [Buprestis] 3
interruptus LeConte [Agrilus] 199, 201, 202
jacobinus Horn [Agrilus] 15, 251, 253, 257, 258
juglandis Knull [Agrilus] 10, 93, 97, 98
knausi Schaeffer [Agrilus] 190, 192
lacustris LeConte [Agrilus] 17, 78, 234, 241, 305, 310, 311
latebrus Castelnau and Gory [Agrilus] 127, 129
lateralis (Say) [Agrilus] 8, 34

Page

lateralis Say [Buprestis] 34

lautuellus new species [Agrilus] 13, 202, 207

lecontei Saunders [Agrilus] 15, 16, 272, 284, 289, 291

Lombardy poplar borer 141

lucanus Fall [Agrilus] 8, 25

macer LeConte [Agrilus] 10, 98

malvastri new species [Agrilus] 14, 247

masculinus Horn [Agrilus] 9, 56, 61, 63, 94

mercurius Wickham [Agrilus] 234, 236, 237

mimosae new species [Agrilus] 14, 241

muticus LeConte [Agrilus] 16, 302

nevadensis Horn [Agrilus] 8, 10, 11, 20

nigricans Dejean [Agrilus] 199, 201, 202

niveiventris Horn [Agrilus] 11, 145, 148, 149, 150, 153, 214

obliquus LeConte [Agrilus] 64, 66, 68, 69, 70

oblongus new species [Agrilus] 18, 333

obolinus LeConte [Agrilus] 12, 190

obsoletoguttatus Gory [Argilus] 13, 196, 199

obtusus Horn [Agrilus] 8, 37

occidentalis Uhler [Agrilus] 39, 41

olentangyi Champlain and Knull [Agrilus] 14, 17, 239, 317

olivaceoniger new species [Agrilus] 11, 124, 127, 133

ornatulus Horn [Agrilus] 13, 202, 204, 205

otiosus Say [Agrilus] 7, 9, 27, 56, 75, 78, 79, 81, 88, 91, 93, 96, 98, 229, 232, 320, 325, 326, 329.

Pacific oak twig-girdler 56

palmacollis Horn [Agrilus] 15, 272, 277

palmaticollis Kerremans [Agrilus] 272

paramasculinus Champlain and Knull [Agrilus] 9, 61

parvus Saunders [Agrilus] 318, 320

pensus Horn [Agrilus] 11, 155

perlucidus Gory [Agrilus] 171

pilosicollis new species [Agrilus] 10, 111

pinalicus Wickham [Agrilus] 101, 103

plumbeus LeConte [Agrilus] 214, 216, 217

polita Say [Buprestis] 213

politus (Say) [Agrilus] 7, 13, 53, 56, 72, 145, 193, 210, 212, 213, 218, 219, 226, 227, 326, 335

populi new species [Agrilus] 11, 22, 145, 148, 150

praepolitus Wickham [Agrilus] 335

prosopidis new species [Agrilus] 15, 274, 275

pseudocoryli new subspecies of politus Say [Agrilus] 71, 72, 214, 218

pseudofallax Frost [Agrilus] 16, 262, 265, 267, 269, 284, 289

pubescens new species [Agrilus] 17, 315

pubifrons new species [Agrilus] 14, 237

pubiventris Crotch [Agrilus] 305, 307, 308

pulchellus Bland [Agrilus] 3, 6, 10, 12, 101, 179, 180

pulchellus (Bland) [Engyaulus] 3, 101

puncticeps LeConte [Agrilus] 10, 96

pusilla Say [Buprestis] 317

pusillus (Say) [Agrilus] 17, 317, 320

putillus Say [Agrilus] 18, 331, 335

quadriguttatus Gory [Agrilus] 11, 138, 140, 141

Page

quadriimpressus Ziegler [Agrilus] 11, 120, 124, 132, 133

quatuordecim-spilota Obenberger (14-spilota) [Agrilus] 336

quercicola new species [Agrilus] 10, 120, 127, 130

quercus Schaeffer [Agrilus] 15, 16, 270, 284

Raspberry gouty gall beetle 34

Red-necked raspberry cane borer 34

restrictus Waterhouse [Agrilus] 12, 173, 188

rubicola Abeille (aberration of communis Obenberger) [Agrilus] 209

rubrovittatus (Waterhouse) [Agrilus] 3

rubrovittatus Waterhouse [Engyaulus] 3

ruficollis (Fabricius) [Agrilus] 8, 29, 34, 37, 42, 44, 318, 320

ruficollis Fabricius [Buprestis] 3, 29

ruficollis (Fabricius) [Teres] 29

sayi Saunders [Agrilus] 34

scitulus Horn [Agrilus] 13, 196

sierrae VanDyke [Agrilus] 15, 17, 253, 315

sinuata Olivier [Buprestis] 220

Sinuate pear tree borer 224

sinuatus (Olivier) [Agrilus] 13, 127, 160, 220

snowi Fall [Agrilus] 12, 180

solitarius Harold [Agrilus] 214

strigicollis Fall [Agrilus] 14, 232

subaeratus Harris [Agrilus] 199, 202

subalteata LeConte [Agrilus] 336

subcinctus Gory [Agrilus] 16, 299

subfasciatus LeConte [Agrilus] 291, 293, 294

subtropicus Schaeffer [Agrilus] 8, 22, 26

sulcaticeps Abeille [Agrilus] 224, 226

Taphrocerus Solier agriloides Crotch 190, 331

tenuis Gory [Agrilus] 336

Teres Harris 3, 29, 34, 138
  granulata Say 3, 138
  innuba Fabricius 3
  ruficollis Fabricius 3, 29, 34

texanus Crotch [Agrilus] 166, 168

thoracicus Castelnau and Gory [Agrilus] 336

torpidus LeConte [Agrilus] 162, 164, 165, 166

torquatus LeConte (subspecies of arcuatus Say) [Agrilus] 64, 66, 68, 69

townsendi Fall [Agrilus] 9, 13, 48

transimpressus Fall [Agrilus] 9, 88

trivittatus Horn [Agrilus] 116

Two lined chestnut borer 118

umbratus Harold [Agrilus] 336

ventralis Horn [Agrilus] 12, 188

virens Gory [Agrilus] 82

virescens Dejean [Agrilus] 81

viridifrons LeConte [Agrilus] 335

viridis (Linnaeus) [Agrilus] 2, 209, 210, 212

viridis Linnaeus [Buprestis] 2, 78, 81, 209

vittaticollis (Randall) [Agrilus] 10, 104, 107, 109, 111, 207, 209

vittaticollis Randall [Buprestis] 104

walsinghami Crotch [Agrilus] 12, 175, 176, 182, 184

zemes Gory [Agrilus] 194, 196

INDEX TO THE PLANTS MENTIONED IN THIS PAPER

Page
Acacia farnesiana 198, 207, 274, 277, 281
Acacia greggii 317, 331
Acer species 218
Acer glabrum 217
Acer negundo 59
Acer pennsylvanicum 217
Acer rubrum 59
Acer saccharum 333
Alder 13, 144, 157, 218, 226
Alder, Mountain (Alnus tenuifolia) 220
Alder, Oregon (Alnus rubra) 152
Alder, Poplar-leaf (Alnus tenuifolia) 220
Alder, White (Alnus rhombifolia) 220
Alnus species 144, 218
Alnus incana 157
Alnus rhombifolia 220
Alnus rubra 152
Alnus tenuifolia 220
Amelanchier canadensis 107
Amorpha fruticosa 320
Apple 37, 107
Arbutus menziesii 52
Arizona White Oak (Quercus arizonica) 284
Arroyo Willow (Salix lasiolepis) 217
Ash-leaved Maple (Acer negundo) 59
Ash, Prickly (Xanthoxylum clava-herculis) 41, 42
Aspen 22, 165
Aspen, Large-tooth (Populus grandidentata) 165
Balm-of-Gilead (Populus balsamifera candicans) 165
Balsam Poplar (Populus balsamifera) 165
Bayberry (Myrica carolinensis) 36, 37
Beech (Fagus grandifolia) 67, 118, 119, 202, 212, 226
Beech, Blue (Carpinus caroliniana) 119, 202, 209
Betula species 129
Betula alba 165
Betula fontinalis 165
Betula lenta 126, 165, 202
Betula lutea 165
Betula nigra 155
Betula papyrifera 165
Betula populifolia 165
Birch 129, 226
Birch, Black (Betula lenta) 165
Birch, European White (Betula alba) 165
Birch, Gray (Betula populifolia) 165
Birch, Paper (Betula papyrifera) 165
Birch, Red (Betula fontinalis) 165
Birch, River (Betula nigra) 155
Birch, Sweet (Betula lenta) 126, 165, 202
Birch, White (Betula populifolia) 165
Birch, Yellow (Betula lutea) 165
Blackberry 33
Black Birch (Betula lenta) 165
Black Cottonwood (Populus trichocarpa) 22, 152
Black Locust (Robinia pseudoacacia) 17, 196, 328
Black Oak (Quercus velutina) 67, 118, 138
Black Walnut (Juglans nigra) 9, 90
Blue Beech (Carpinus caroliniana) 119, 202, 209
Box Elder (Acer negundo) 58
Burr Oak (Quercus macrocarpa) 118
Butternut (Juglans cinerea) 10, 96
California Black Oak (Quercus kelloggii) 56
Page
Callirhoe involucrata 305
Canyon Live Oak (Quercus chrysolepis) 56
Capul (Momisia pallida) 24
Carolina Poplar (Populus deltoides pilosa) 165
Carpinus caroliniana 119, 202
Castanea dentata 67, 118
Catclaw (Acacia greggii) 317, 331
Celtis laevigata 295
Celtis occidentalis 20, 100, 196, 294, 325
Celtis pallida 24
Cherry, Choke (Prunus species) 107
Chestnut (Castanea dentata) 67, 118
Choke Cherry (Prunus species) 107
Coast Live Oak (Quercus agrifolia) 55, 149
Comptonia peregrina 37
Cornus florida 232, 294
Corylus species 218
Corylus americana 69, 72, 87, 130, 219
Corylus rostrata 72, 219
Cottonwood (Populus deltoides) 141, 153, 165, 196
Cottonwood, Black (Populus trichocarpa) 22, 152
Cottonwood, Northern Black (Populus trichocarpa hastata) 165
Crab, Wild 107
Crataegus species 13, 107, 223, 229
Croton species 307
Croton capitatum 307, 308
Croton eleagnifolium 308
Dewberry 33
Diospyros virginiana 48
Dogwood (Cornus florida) 14, 232, 294
Dwarf Maple (Acer glabrum) 217
Ebony, Texas (Pithecolobium flexicaule) 291
Elder, Box (Acer negundo) 58
Elm 67, 192
Engelmann Oak (Quercus engelmannii) 56
Erigeron species 103
European White Birch (Betula alba) 165
Fagus americana 67, 119, 202
Fagus grandifolia 67, 119, 202
False Indigo (Amorpha fruticosa) 320
Fleabane (Erigeron species) 103
Frostweed (Helianthemum canadensis) 311
Gambel's Oak (Quercus utahensis) 50, 61, 122
Garabato (Momisia pallida) 24
Gleditsia triacanthos 42, 196, 289
Granjeno (Momisia pallida) 24
Granjeno huasteco (Momisia pallida) 24
Gray Birch (Betula populifolia) 165
Hackberry (Celtis occidentalis) 17, 20, 24, 100, 196, 294, 325
Hazel 9, 13, 69, 72, 87, 130, 218, 219
Helianthemum canadensis 311
Hickory 9, 70, 85, 202, 329
Hicoria species 70, 85, 202, 329
Highland Live Oak (Quercus wislizenii) 55
Honey Locust (Gleditsia triacanthos) 41, 42, 196, 289
Hop Hornbeam (Ostrya virginiana) 29, 119, 157, 202, 209
Huckleberry 44, 173, 262
Huisache (Acacia farnesiana) 198, 207, 274, 277, 281
Ironwood (Carpinus caroliniana) 29, 119, 157, 202, 209

Page
Juglans cinerea 96
Juglans nigra 90
Large-tooth Aspen (Populus grandidentata) 165
Leather Oak (Quercus durata) 55
Locust, Black (Robinia pseudoacacia) 17, 196, 328
Locust, Honey (Gleditsia triacanthos) 44, 42, 196, 289
Locust, New Mexican (Robinia neomexicana) 328
Locust, Yellow (Robinia pseudoacacia) 311
Lombardy Poplar (Populus nigra italica) 141, 152
Lonicera nigra 226
Madrone (Arbutus menziesii) 9, 13, 52
Malvastrum coccineum 248, 249
Manzanita (Arbutus menziesii) 9, 13, 52
Maple 13, 218
Maple, Ash-leaved (Acer negundo) 59
Maple, Dwarf (Acer glabrum) 217
Maple, Red (Acer rubrum) 59
Maple, Striped (Acer pennsylvanicum) 217
Maple, Sugar (Acer saccharum) 333
Mentzelia nuda 171
Mesa Oak (Quercus engelmannii) 56
Mesquite (Prosopis juliflora) 274, 277
Mimosa borealis 243
Monnisia pallida 24
Mountain Alder (Alnus tenuifolia) 220
Mountain Willow (Salix scouberiana) 217
Myrica carolinensis 36, 37
New Mexican Locust (Robinia neomexicana) 328
Northern Black Cottonwood (Populus trichocarpa hastata) 165
Nuttall Willow (Salix scouberiana) 217
Oak 9, 10, 13, 53, 75, 93, 109, 129, 135, 188, 196, 226, 241, 262, 272, 286
Oak, Arizona White (Quercus arizonica) 284
Oak, Black (Quercus velutina) 67, 118, 138
Oak, Burr (Quercus macrocarpa) 118
Oak, California Black (Quercus kelloggii) 56
Oak, Canyon Live (Quercus chrysolepis) 56
Oak, Coast Live (Quercus agrifolia) 55, 149
Oak, Engelmann (Quercus engelmannii) 56
Oak, Gambel's (Quercus utahensis) 50, 61, 122
Oak, Highland Live (Quercus wislizenii) 55
Oak, Leather (Quercus durata) 55
Oak, Mesa (Quercus engelmannii) 56
Oak, Post (Quercus stellata) 37
Oak, Red (Quercus rubra) 118, 132, 135, 202, 223
Oak, Scarlet (Quercus coccinea) 118
Oak, Scrub (Quercus species) 237
Oak, Tan (Quercus densiflora) 56
Oak, White (Quercus alba) 37, 66, 67, 78, 118, 307
Oregon Alder (Alnus rubra) 152
Ostrya virginiana 29, 119, 135, 157, 202, 209
Oxydendrum arboreum 48
Palo Verde (Parkinsonia microphylla) 257, 265
Paper Birch (Betula papyrifera) 165
Parkinsonia microphylla 257, 265
Parthenocissus quinquefolia 329
Peach 269
Pear 13, 107, 223
Pecan 165
Persimmon (Diospyros virginiana) 48
Pithecolobium species 322
Pithecolobium flexicaule 291
Poison Ivy (Toxicodendron radicans) 302
Page
Poplar 11, 37, 130, 153
Poplar, Balsam (Populus balsamifera) 165
Poplar, Carolina (Populus deltoides pilosa) 165
Poplar-leaf Alder (Alnus tenuifolia) 220
Poplar, Lombardy (Populus nigra italica) 141, 152
Populus species 130, 141
Populus balsamifera 165
Populus balsamifera candicans 165
Populus deltoides 141, 165
Populus deltoides pilosa 165
Populus grandidentata 165
Populus nigra italica 141, 152
Populus tremuloides 22, 165
Populus trichocarpa 22, 141, 152
Populus trichocarpa hastata 165
Post Oak (Quercus stellata) 37
Prickly Ash (Xanthoxylum clava-herculis) 41, 42
Prosopis juliflora 274, 277
Prunus species 107
Pussy Willow (Salix discolor) 165
Pyrus species 107
Pyrus communis 223
Quercus species 33, 93, 109, 129, 135, 138, 188, 237, 241, 262, 272, 286, 307
Quercus agrifolia 55, 149
Quercus alba 66, 67, 78, 118
Quercus arizonica 284
Quercus californica 56
Quercus chrysolepis 56
Quercus coccinea 118
Quercus densiflora 56
Quercus durata 55
Quercus engelmannii 56
Quercus gambelii 50, 61, 122, 130
Quercus kelloggii 56
Quercus macrocarpa 118
Quercus rubra 118, 132, 202, 223
Quercus utahensis 50, 61, 122
Quercus velutina 67, 118
Quercus wislizenii 55
Raspberry 33, 75, 226
Red Birch (Betula fontinalis) 165
Red Maple (Acer rubrum) 59
Red Oak (Quercus rubra) 118, 132, 135, 202, 223
Rhus glabra 61
River Birch (Betula nigra) 155
Robinia neomexicana 328
Robinia pseudoacacia 311, 328
Rosa species 226
Rosa blanda 212
Rosa carolina 212
Rosa hugonis 212
Rosa multiflora japonica 212
Rosa nitida 212
Rosa rubrafolia 212
Rosa rugosa 212
Rosa setigera 212
Rose 13, 33, 209, 226
Rose, Wild 212
Rubus species 33
Salix species 33, 42, 144, 149, 218
Salix babylonica 217
Salix discolor 165
Salix lasiandra 147, 150, 217
Salix lasiolepis 148, 217
Salix scouberiana 217

Page
Scarlet Oak (Quercus coccinea) 118
Scrub Oak (Quercus species) 237
Serviceberry (Amelanchier canadensis) 107
Shad Bush (Amelanchier canadensis) 107
Sourwood (Oxydendrum arboreum) 48
Striped Maple (Acer pennsylvanicum) 217
Sugarberry (Celtis laevigata) 295
Sugar Maple (Acer saccharum) 333
Sweet Birch (Betula lenta) 126, 165, 202
Sweet Fern (Comptonia peregrina) 37

Tan Oak (Quercus densiflora) 56
Texas Ebony (Pithecolobium flexicaule) 291
Thorn (Crataegus species) 13, 107, 223, 229
Toxicodendron radicans 302

Ulmus species 192

Virginia Creeper (Parthenocissus quinquefolia) 329

Walnut, Black (Juglans nigra) 9, 90
Weeping Willow (Salix babylonica) 217
Western Black Willow (Salix lasiandra) 147, 150, 217
White Alder (Alnus rhombifolia) 220
White Birch (Betula populifolia) 165
White Oak (Quercus species) 37, 66, 67, 78, 118, 307
White Willow (Salix lasiolepis) 148, 217
Wild Crab 107
Wild Rose 212
Willow (Salix species) 11, 13, 33, 42, 144, 153, 218
Willow, Arroyo (Salix lasiolepis) 217
Willow, Mountain (Salix scouberiana) 217
Willow, Nuttall (Salix scouberiana) 217
Willow, Pussy (Salix discolor) 165
Willow, Weeping (Salix babylonica) 217
Willow, Western Black (Salix lasiandra) 147, 150, 217
Willow, White (Salix lasiolepis) 148, 217
Xanthoxylum clava-herculis 42
Yellow Birch (Betula lutea) 165
Yellow Locust (Robinia pseudoacacia) 311

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